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METAL FINISHING

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Nickel Restrictions Are Lifted

As of November 1, curbs ended on the last major metal to remain under full control. All allocation and end use restrictions are now relaxed and nickel plating is again permissible in any thickness and on any item.

Last month we reminded our readers that decontrol would not mean any increase in the amount of nickel available for the civilian market in the near future. Not only has this been confirmed, but there was an indication, in the announcement by Arthur S. Fleming, director of the Office of Defense Mobilization, that the civilian supply might even be less for a time because of a program of Government purchases for stockpile requirements.

Since defense needs are expected to take 40 per cent of the nickel supply, aside from the stockpile purchases, the outlook for the civilian user is going to remain dreary for a while. This despite optimistic press statements like the one by W. D. Mitchell, administrator of the Small Business Administration, to the effect that the decontrol action would be "good news to many small business firms" who "will breathe a sigh of relief."

Responsibility for equitable distribution of the remaining supply has been returned to private industry and suppliers have been quick with their assurances that this will be done to the best of their ability. Nothing has occurred, however, to dispel the fear we expressed on this page last month concerning favored users and black marketeers. The nickel plating industry is on record, through its advisory committees, of favoring discontinuance of end use restrictions but only a small element has favored the complete decontrol, aside from defense contracts, which has been decided upon.

Only the future will tell whether our fears were groundless. The Government's position is that continuance of controls will not relieve present dislocation and hardship, and that free market distribution will be just as equitable, effective and orderly. If this turns out to be a false hope, there is a very strong possibility that distribution controls will be reinstated without, however, the onerous end use restrictions.

Nathaniel Hall

Electroplating in Israel

By Marvin Rubinstein, *Metal Finishing Consultant*

Mr. Rubinstein recently completed 2½ years of work in Israel, where he was sent at the invitation of the Israeli Government. (The new photograph he sent *Metal Finishing* expressly for this article represents, he informs us, "a temporary attempt to 'do as the Romans do'.") Between setting up a number of laboratories and large shops in Israel for Government and private industry, he found time to lecture on modern development in the finishing field and to make this comprehensive survey of the metal finishing picture there. Things move very fast in Israel, so the author refuses to guarantee that every detail in this comprehensive survey is absolutely up to date. But, it should be close enough.

While en route back to the United States, Mr. Rubinstein is gathering material on electroplating in a number of other Middle East and European countries. The reader may expect further articles on these in the very near future.

ISRAEL, the Land of the Bible — one of the world's oldest Countries and yet one of its newest States — is situated on the Continent of Asia at the extreme Eastern end of the Mediterranean Sea, roughly 5,600 miles by air from the United States. It is a tiny country, no larger than the State of New Jersey, with at least sixty percent of that area consisting of the Negev, a magnificiently colorful waste of rock and desert, but as yet relatively under-populated and unproductive.

The State of Israel came into being only 5½ years ago in May, 1948 — the result of a 2,000-year-old dream of the Jewish people, a political declaration by a British statesman in 1922, a United Nations decree, and a short but bitterly fought war with her Arab neighbors. Tel Aviv, her largest city, is situated on land over which nothing but desert sand drifted a short fifty years ago. Her total population numbers somewhat less than two millions, of which more than fifty percent are recent arrivals brought in after Israel became a state.

It is a heterogeneous population. Cosmopolites who hardly ever before left the confines of New York City mingle with olive skinned fellow citizens from Yemen, the Southern tip of the sandy wastes of Arabia. The common language is modern Hebrew, but English, French, German, Spanish, Yiddish, Arabic, Russian, Dutch, Czech, Hungarian, Bulgarian, Polish, Greek, Turkish, and sometimes even Chinese are commonly heard in the city streets. Many of its citizens never saw a movie or an autocar, never wore a pair of shoes before coming there. More important as regards this article, many never did any factory work of any kind whatsoever. With such an unusual development, it is small wonder that over 200 books have been written about Israel in a dozen languages, including Icelandic.

An electroplater visiting Israel will find much that is rewarding. He may walk the streets that King Solomon walked, visit Nazareth where Christ lived, inspect a fortress at Acre which defied a siege by Napoleon. He may inspect ancient Roman ruins at Copernaeum, Caesaria, Ashkalon and Beisan; visit the lowest spot on earth, the Dead Sea, where Lot's wife was turned into a pillar of salt; or spend a few days in a modern communal settlement called a "Kibbutz."

But, if he enjoys mixing business with pleasure, he will also find in Israel "Tzipui Hashmali" ("Electroplating" in the Hebrew language) at a greater stage of development than anywhere else in the Middle East, Greece or Yugoslavia. Typical of the real interest shown there in electroplating is the fact that, in spite of a serious dollar shortage, nine Israelis subscribe to METAL FINISHING. Not only in the metal finishing field but in general industrial development, Israel has made and is making efforts to develop a modern industrial state out of what until recently was a feudal, agrarian economy.

Number of Shops

There are approximately 115 shops and factories in Israel doing electroplating, anodizing, chemical treatment of metals, hot-dip galvanizing, hot tinning, and related metal finishing. Of these, the writer has visited at least 70, including the largest job shops, the most important factories, those shops doing specialty work, and those in unusual places. For the purposes of this survey, with a few special exceptions only those shops are included which utilize a source of at least sixty amperes current, have baths of at least fifteen gallons capacity, and have two or more workers. Dozens — perhaps hundreds — of smaller outfits also do metal finishing, but most of them deal only with metal coloring on jewelry and local craft work or with other

minor operations which do not appreciably affect the local finishing picture.

Geographically, more than half of these finishing shops are located in Tel Aviv-Jaffa, a city of 400,000 people and a center of small industry. (The old city of Jaffa is now administratively combined with Tel Aviv.) Haifa, Israel's second largest city (75,000 people) and its center of heavy industry and shipping, falls way below with only thirteen plating shops; while Jerusalem — the nation's capitol — has only nine and most of these very tiny. A more complete geographic breakdown is given below:

Tel Aviv-Jaffa	62	Rehovot	2
Haifa Area	13	Holon	2
Jerusalem	9	Pardess Katz	2
Ramat Gan	6	Pardess Hanna	1
Petach Tikva	3	Migdal Gad	1
Nachlat Itzhak	4	Acre	1
Bnei Berack	2	Ramle	1
Kibbutzim (Eilon, Yad Mordechai, Kissufim)			3
Other Places			3

The geographic disproportion is even more evident when it is pointed out that Ramat Gan, Nachlat Itzhak, Bnei Berack, Pardess Katz, and Holon are for all practical purposes part of the Tel Aviv area. Consequently, more than two-thirds of the finishing shops are closely congregated in central Israel, the remainder being evenly divided between the Northern and Southern sectors.

Types and Size of Shops

Of the shops mentioned above, about eighty are job-plating shops. The rest do finishing as part of a manufacturing operation. Israeli Government departments own several in Ordnance and Supply in addition to Air-Force repair depots. One shop, in the Weizmann Institute in Rehovot, operates only for research purposes, while another in the Hadassa-Brandeis Institution in Jerusalem is used as part of a training course for toolmakers and machinists. Solel Boneh, Ltd. — the huge building and contracting unit of Israel's all encompassing labor union "the Histadrut" — controls another two shops and at least part of a third. Three shops are located in communal settlements and collectively owned by their members — an arrangement without parallel among U. S. platers. And the other 100 or so shops are in private or corporate hands.

By American standards, the huge bulk of Israeli plating shops would be considered small, while even her largest plants would only be thought of as medium sized. An average Israeli plater has a rectifier or generator of 200 amperes capacity. He plates copper, nickel, and usually one other metal in baths of 100 gallon volume. He runs one or possibly two polishing lathes, depending on the type of shop. Two or three men work for him, but he personally supervises and pitches-in for most of the day.

The smallest shop covered in this survey is that of *Ignatz Heisler* of Tel Aviv, who manufactures artificial teeth, and prepares his molds by electroforming. Mr. Heisler's plating section covers roughly fifty square feet of floor space in which he operates a 60 amp., 6 v. rectifier, a three-gallon copper bath and a two-gallon nickel bath. He handles this installation with the aid of one assistant, both of them only giving part time to the plating end of the business.

At the other end of the scale can be found the job-plating outfit of *Kushman-Barzili* with the largest plating output in the country. Kushman-Barzili have two good sized plants — the original one and main office in Tel Aviv and a brand new, modern shop in Bnei Berack. The Bnei Berack branch, known also as "Shenkar," does only plating for corrosion prevention (no polishing). Here can be found four cyanide zinc baths of 500 gallons, 650 gallons, 650 gallons, and 1200 gallons respectively, the largest of these being thirteen feet long. There is also a thirteen feet long, 500 gallon brass bath and fourteen barrels (mostly diagonal) doing zinc, brass, nickel and tin.

Outside in the back yard — a familiar phenomenon in Israel plating shops — one finds a 300 gallon caustic degreasing bath (oil heated; brick kiln type furnace), assorted pickles totalling 650 gallons, and seven diagonal tumbling barrels. To complete the picture, there

One of many old mosques in Acre, ancient fortified city with a very Oriental flavor. Acre boasts one plating shop "Doran", where age-old arts and crafts are kept alive by workers from Tripoli and Morocco.

is a sawdust drying bin, two sawdust drying barrels; a centrifugal dryer and assorted rinses. A fairly well equipped analytical laboratory is attached.

Current requirements are satisfied by two 1,000 Amp., 8 V. rectifiers; one 500 Amp., 15 V. rectifier; one 1,500 Amp., 6 V. generator; and a 300 Amp., 15 V. generator — a total current capacity of 4,300 amperes (with another 1,500 Amp. rectifier on order). All rectifiers, incidentally, are oil cooled. Eight to ten employees keep this shop running. A good portion of the work consists of 0.001 inch thick zinc plating on electrical hardware for corrosion resistance under outside conditions. This, in the writer's opinion, is the best of Israel's job shops — light, airy, and efficient, turning out good quality work.

The Tel Aviv branch, which formerly housed both plants, now contains only one chromium bath of 350 gallons, one tin bath of 300 gallons, two nickel baths of 550 gallons each, and a 300 gallon acid copper bath. An additional two hard chromium baths and one hard nickel bath of 100 gallons each are now being set up. Four double polishing lathes (using six to fifteen inch wheels), a centrifugal dryer, and ancillary cleaning, rinsing, etching and strip baths complete the story. Six generators, varying in size from 300 to 1,500 amperes each, supply a total of 4,050 amperes current. This shop employs from four to ten workers, depending on season.

Typical Large Shops

Between the Heisler shop with its 60 amperes and two workers and Kushman-Barzili's total of 8,000 amperes run by twenty workers lie the remainder of Israel's platers. Of these, only fifteen or so utilize 700 amperes or more, employ at least four men; and only half of this number are relatively large shops.

Second largest job shop in Israel is *Chilazon-Matechet, Ltd.* of Jaffa. With nine baths varying from 200 to 800 gallons and ten barrels, they plate chromium, nickel, copper, brass, zinc, tin, and lead. Plans are also afoot for a hot-dip galvanizing unit. Five rectifiers in this plant provide a total of 3,000 amperes, and ten workers are employed here. Four double-head polishing lathes are in operation. *Metachrome*, Tel Aviv's third largest job shop, has two rectifiers and two generators feeding 1,600 amperes total to eight still baths (largest: 700 gallons) and eleven barrels. This plant is larger than would appear, lacking sufficient current for its solution volume. Four to six men work here.

In the Haifa area, the "plating-shop-size" honors are more or less evenly divided between *Chrommetal* and the firm of *Dr. Levitas*. The former uses rectifiers totalling 2,200 amperes for its chromium, nickel, copper, zinc, and silver baths and barrels. In season, twelve workers are employed, but part of their time is spent at other tasks, since this firm also manufactures plumbing taps and valves in addition to its job work. Dr. Levitas, one of the better plating craftsman in Israel, owns two generators giving together 1,400 amperes, employs four men in season. His smallest bath, gold, is only one gallon; his largest, nickel, is 550 gallons. His polishing department has two double lathes.

Certainly worthy of mention among the large shops are two of the Government-run plants, which use over

A set of table model cigarette lighters manufactured by "Viktra", an Israeli firm with U. S. commercial backing. The upper rims are chrome plated.

2,500 amperes each. These are two of Israel's most up-to-date shops, having been planned and installed by the writer. They do both hard and decorative chromium, hard and decorative nickel, copper, zinc, cadmium, tin, silver, lead, indium (on bearings), phosphating, chemical blackening, anodizing (both chromic and sulfuric) and dying, and passivating treatments on magnesium castings, zinc and cadmium. Both have good laboratories for analysis, testing and control. Unfortunately, for reasons of military security, the writer is unable to describe these shops in detail.

"Medium Sized" Shops

Somewhat smaller plating plants, but still "large" by Israeli standards, are the *Economic* works in Ramat Gan, *Viktra* in Jaffa, *D. Davidoff Plating Co.* and *Galvano-Chrome* in Tel Aviv, *Neptun* plating in Ramat Gan, *Hamat, Ltd.* in Nachlat Itzhak, *Metalanod* in Ramle, *Paamon Bell* in Bnei Berack, and the *Nachshom Lock Factory* in Jerusalem.

Economic, manufacturers of "Atom" electric heaters, kettles, stoves, etc., has 800 gallons each of nickel and copper and 400 gallons of chromium in operation, all fed by a 2,000 ampere rectifier. They also have a hot-dip galvanizing installation with a three ton per day capacity and a hot tinning pot of 25 gallons. Viktra, a relatively new firm with substantial American capital and control, also does copper, nickel and chromium on electrical kettles as well as on novelty items such as cigarette lighters. They use more than 1,000 amperes in a fairly modern shop.

Davidoff and Galvano-Chrome are rather primitive job shops, both giving most of their capacity to tubular steel furniture. Both do copper, nickel and chromium in baths of 200 to 400 gallons each. One has two double polishing wheels and one has three; each has a 700 ampere current supply. Neither has exhaust ventilation on his chromium. Neptun, another job shop doing much work on tubular furniture and tubular steel construction for children's carts, uses three rectifiers giving a total of 620 amperes. The chromium bath there holds 200 gallons, while the copper and nickel hold 650 gallons each. There are four double polish-

ing wheels. Five workers keep the work going in this relatively orderly shop.

Hamat, Ltd., one of Solel Boneh's plants, for the most part works on plumbing faucets and fittings in a more or less modern plant. They have a 300 gallon nickel bath (with filtration), a 100 gallon chromium bath (with an exhaust), a 250 ampere generator, a 1,000 ampere rectifier, both hot and cold cleaners, and a very large polishing department with eight double lathes.

The firm of Metalanod does only anodizing and dyeing in a nicely set-up and well controlled plant, but is rather limited in number of tanks. The plant consists of a 500 Amp., 15 V. oil cooled rectifier, an 800 gallon H_2SO_4 anodizing bath (lead lined), six dye baths (black, brown, blue, red, yellow and gold), and two polishing lathes. The anodizing tank is eight feet long, air agitated, water cooled, and thermostatically controlled. A water softening unit — a rarity in Israeli plating shops — can be found here. The firm, in addition to job work, does metal spinning and manufactures lamp shades and photographic reflectors of spun aluminum.

Paamon Bell, manufacturers of sheet-metal household ware, have the largest hot-dip galvanizing installation in Israel. This installation, set up by the writer, has an oil-fired galvanizing setting, eight feet by four feet by four feet deep, holding a charge of twenty tons of zinc, and capable of turning out more than fifteen tons of work per eight hour day. Preceding this is a line set-up of five preparatory tanks (degreasing, pickling, rinsing, and fluxing), averaging 650 gallons each, and set in a below-floor-level drainage pit specially constructed for the plant. Overhead cranes carry the work from one tank to another and then to storage. Only a small percentage of total output is used for the firm's own work, the remainder being given over to job work on both sheet and fabricated stock for other concerns. This particular installation, less than one year old and still developing, employs as yet only four workers.

The Nachshom Lock Factory, Jerusalem's only plating shop of substantial size, is also Israel's only electrotyping plant. With a current capacity of approximately 2,500 amperes, they run a number of acid copper electrotyping baths in addition to a ten foot, 550 gallon brass bath in which they do their lock hardware and long door hinges. With few exceptions, this just about completes the list of larger shops in Israel. The remainder utilize not more than 500 amperes each and in most cases less than half of that. A plater in Israel constantly hears of plans for bigger and better installations, but the picture at the moment is the one given above.

Metals Plated

What finishes can be found in operation in Israel's shops? Almost all of the 115 shops surveyed do copper and nickel plating. Silver is next in popularity, with baths in thirty-five plants. The bulk of shops using silver are tableware, holloware, and novelty manufacturers — a thriving industry in Israel. Foremost in this line are *Michsaf* in the town of Holon (which, incidentally, means "sand dunes") and *Mazref* in Ramat Gan. Both turn out top quality work for both domestic use and export.

In five silver baths of 85 gallons each and one gold bath (used only for the insides of bowls, etc.), Michsaf plates 2,000 parts daily — most of it knives, forks, and spoons. The base metal is brass, on which is deposited a matte silver 0.0005 inches thick. In Israel, incidentally, there is very little polished silver finishing, the matte surface being more in line with the public taste and easier to produce—a happy combination. The Michsaf plant is complete, handling all the manufacturing operations from design and stamping through inspection and packing, even to the extent of maintaining their own laboratory and research department.

Mazref is smaller but somewhat more versatile, both in finish and types of product. In addition to silver, their major output, they do nickel, copper, three shades of gold and oxidizing on numerous types of holloware and novelties such as cigarette cases, bon-bon dishes, etc. The firm also has plans for setting up production of plated designs on glassware and porcelain, a type of work not as yet being done in Israel.

Continuing with types of finishes, approximately twenty shops do chromium plating; ten do zinc, and five have tin baths; seven do gold plating, all on a small scale and mostly on novelties. Among the zinc plating shops, a rather unusual one is located in Israel's extreme North, practically on the Lebanese border ,in Kibbutz Eilon.

A "Kibbutz" is a communal settlement where all of the members live under cooperative conditions, eat in common dining halls, and share in the proceeds of the commonly worked orange groves, cattle barns, vegetable gardens, chicken runs, factories, and — in this case — plating shop. Starting from scratch and with no experience, this kibbutz has now developed a shop working with more than 500 amperes. Most of their work is zinc plating of telephone line hardware for outside corrosion resistance. *Eilon* is one of three kibbutzim doing electroplating, the other two being *Yad Mordechai* and *Kissufim*, both in the Negev near the Gaza Strip.

Brass is plated by five firms — the three largest job shops and *Nachshom* all previously mentioned, as well as by *Selecta* in Petah Tikva, a small firm manufacturing pocketbook frames, briefcase locks, hinges and the like. All of Selecta's equipment and methods, incidentally, come from Belgium. Only three shops do lead plating, and only one of these, *Chilazon-Matachet*, on a commercial scale. The other two, Government shops, use it on bearings and in fabricating inside anodes for hard chromium plating. The cadmium plating field also seems to be a monopoly of these two shops, while indium finds use only in the Air Force.

Special Finishes

So much for actual metals being plated. Among the special types of operations, five firms can be found doing hard chromium and three working on hard nickel for engineering build-up. Once again, Kushman-Barzili and two large government shops take the lead in both these operations, while Haifa's two largest job shops, Chrommetal and Levitas, do only the hard chromium and in much more limited quantities.

Though many pot-sized galvanizing set-ups exist in Israel, only three plants do hot-dip galvanizing on an

extensive scale, including Paamon Bell and Economic, already mentioned. The third is one of Israel's Southernmost factories, the giant sized *Yuval Gad Reinforced Concrete Pipe Company* located in Migdal Gad near the ancient Philistine town of Ashkalon.

Here are manufactured pre-stressed concrete pipes of diameters up to eight feet, under license from an American firm which originally set up the plant. The galvanizing shop there, a relatively unimportant part of the factory, works only on heavy flanges, rims, and connecting parts for the concrete pipes. In the field of hot tinning, only Economic and a Government supply depot have settings worth mentioning, both relatively small. The supply depot works mainly on the repair of tin plates, utensils and mess kits. Plans exist for a large tinning installation, primarily to handle milk cans, and for another galvanizing plant in Herzelia, but these are as yet only on paper.

In the fields of phosphating and chemical blackening of steel, once more most of this type of work is done by Government ordnance plants. Two major exceptions exist. *Kulka*, a small factory in Tel Aviv manufacturing certain automobile spare parts, does some chemical blackening on a minor scale. *Amcor*, a large factory in Nachlat Itzhak assembling and finishing "Philco" refrigerators, maintain a cleaning and phosphating line as a preliminary to their synthetic enamel finishing. Since a refrigerator to an Israeli housewife is more precious and certainly more necessary than a fur coat to an American woman, there is a second firm manufacturing them in Israel — without phosphating however. *Kestenbaum* of Haifa and New York import used refrigerators and thoroughly recondition them for resale. Their plant includes a small plating shop for refinishing trays, shelves, and other hardware.

Oxidation and coloring of copper, brass and silver, however, find many more practitioners, roughly twenty among the shops in this survey. As a matter of fact, a green patina, simulating the colors found on excavated ancient Hebrew coins and bronzes, has become practically a national color. It appears on two-thirds of the metalcraft ware appearing in Israeli souvenir shops. Other chemical treatments, as for example, passivation of zinc and cadmium are handled only by two large Government shops as a regular procedure, while only an Air Force shop does passivating treatment on magnesium parts.

Anodizing

Anodizing and aluminum dyeing plants, though not plentiful, are more readily available, there being four of them — three large and one small. *Alugon* of Jaffa maintains a good sized shop, working with sulfuric acid. A smaller firm, *Metalloplast* in Tel Aviv, uses oxalic acid, anodizing with alternating current. Metalanod, previously described, also uses H_2SO_4, while only the Air Force shop uses both the sulfuric and chromic acid processes.

Another company called *Bedek* is presently setting up a civilian aircraft repair depot to service "El-Al" (the Israel National Airlines) and the many international lines which stop at Lydda airport. (As a sideline, the reader may be interested in knowing that "El-Al" translated into English means "To-On." The young airline during its first few years of operation had so much trouble keeping its schedules that local wits suggested the name be changed to "El-Ulai" meaning "To-Perhaps.") Bedek has already started buying equipment for a large plating department which will also do chromic acid anodizing, as well as hard chromium, hard nickel, magnesium passivation, lead-indium, and other aircraft repair finishing specialties. It will be well over a year, however, before this shop is actually in operation and can be added to this list.

While on the subject of anodizing, it might be well to note an additional operating difficulty that the anodizer in Israel has which is uncommon in the States. Israeli summers are so hot that all sulfuric acid installations must have refrigerating units. Cold water is just not "cold" enough for cooling when summer temperatures average well in the nineties.

Electroforming

Electroforming, which is not exactly plentiful in the United States, is certainly far less so in Israel. Four — possibly five — companies do this exacting type of work. The Nachshom electrotyping plant has already been mentioned, as has Ignatz Heisler, who electroforms false tooth molds. (*The American Porcelain Tooth Company*, in Nachlat Itzhak, a very large firm with a very small plating shop, also does occasional "special" molds by electroforming; but is not included in this list, since the bulk of its molds are made by casting methods.)

Two firms manufacture phonograph records, including the electroforming of "masters," "mothers," and "stampers"; only final chroming is jobbed out. The largest is called *Hed Arzi*, which in English means "The Echo of My People." They maintain a five-bath shop in Tel Aviv, where roughly eighteen matrices a week are finished on a 48-hour schedule per matrix. This shop uses somewhat antiquated methods and consequently takes too much time, but the results are of high quality. Hed Arzi recordings are also issued in the U. S. by Columbia on long playing records, under special licenses from the Israeli firm.

Competition in this field is provided by *Makolit*, another Tel Aviv company, who also have a matrix electroforming plant, but concentrate more on the local market. Methods used here are similar. Rumor has it that a third competitor is in the offing, which should make this a busy field in Israel.

The "possible" fifth electroformer is the firm of *Epstein-Strauss & Co.* in Petah Tikva, a brand new outfit installed by the writer and associates for the electrodeposition of diamond dust on cutting tools, grinding tools, and dental drills. The writer says "possible," not because this firm is in its infancy having just started production, but because he feels rather uncertain whether plating heavy deposits to act as a binder for an abrasive can rightly be termed "electroforming." In any case, it is interesting to find this rather obscure type of specialized plating in Israel, so the writer feels he must get it in somewhere.

(*To be concluded next month*)

Metals in Phosphating Solutions

Determination by Ion Exchange

By Gunnar Gabrielson, *Kemiska Fabriken Dr. Ernst Harbeck A.B., Partille, Sweden*

Introduction

IN a previous paper[1] a method has been described for the determination of phosphoric acid and accelerators in phosphating solutions by means of a cation exchanger. The phosphating solution is percolated through a layer of a cation exchanger of the sulfonic acid type in the hydrogen form, as a result of which all cations present are exchanged for hydrogen ions. The effluent consists of a dilute solution of phosphoric acid and the acids corresponding to the accelerators in the phosphating solution. After washing with distilled water, the combined effluent and wash water are titrated first against methyl orange and then against phenolphthalein. From these titrations the amounts of phosphoric acid and accelerator can be determined.

In the present paper a method is devised for the determination of the metal content in phosphating baths by means of a cation exchanger in the hydrogen form.

Theory

When a salt solution contacts a cation exchange resin in the hydrogen form the cations are exchanged for hydrogen ions. If a phosphating solution is percolated through the cation exchange column the following reactions occur (the reaction formula below refers to a zinc phosphate bath with sodium nitrate as accelerator):

$$Zn(H_2PO_4)_2 + NaNO_3 + 3RH = 2H_3PO_4 + HNO_3 + R_2Zn + RNa$$

(RH = the hydrogen form of the resin.)

The effluent contains only acids and by titrating with sodium hydroxide against methyl orange the nitric and phosphoric acids are neutralized. Phosphoric acid is in this case titrated as mono-basic acid.

As we know, phosphate solutions always contain an excess of free phosphoric acid and often other acids, e.g. nitric acid. When titrating the phosphate baths directly with sodium hydroxide with methyl orange as indicator these free acids are neutralized. The difference between the consumption of sodium hydroxide for titration before and after the ion exchange passage indicates the equivalents of metal ions which have been exchanged for hydrogen ions, i.e. the amount of metal ions present in the phosphating solution. Supposing the consumption of 0.1 N sodium hydroxide to be "A" ml. for direct titration of 10 ml. of the phosphating bath and "B" ml. after passage of the ion exchanger the amount of metal present in the sample is

$$\frac{(B - A) \times 0.1 \times E}{1000}:$$

where E = the equivalent weight of the metal.

Apparatus

The experiments were performed with a cation exchanger of the sulfonic acid type, Amberlite IR-120. A particle size of 0.20-0.49 mm. in air dried condition was used. The ion exchange columns were of ordinary type[2]. The height and diameter of the resin layers were 150 mm. and 9.8 mm. respectively in all experiments. The ion exchange resin was transformed into the hydrogen form by passing about 100 ml. of 3-4 N hydrochloric acid through the column and subsequent washing with distilled water (about 150 ml.), until neutral reaction of the filtrate was obtained. The flow-rate during regeneration and washing was about 3 ml. per min.

Experimental

The types of phosphating baths used in this investigation were:

1. Manganese phosphate solutions without accelerators. These solutions were prepared by dissolving manganese carbonate in phosphoric acid.
2. Zinc phosphate solutions. These were prepared by dissolving zinc oxide in phosphoric acid, after which the accelerators were added.

All chemicals used for preparing these solutions were very pure and the bath compositions therefore accurately known. The compositions were taken from patents.[3]

10 ml. of the phosphating baths were passed through

the ion exchange column. Afterwards the resin was washed with 50 ml. distilled water. Flow-rate during the adsorption and the washing was 4-5 ml. per min. The combined effluent and wash water were collected in a beaker and titrated with 0.1 N sodium hydroxide solution against methyl orange. 10 ml. of the phosphating bath were also titrated directly with 0.1 N sodium hydroxide against methyl orange. The total amounts of metals in the phosphate solutions were estimated from these titrations as described above. In the accelerated zinc phosphate baths, which contained both zinc and sodium ions, the percentage of zinc was determined through titration with a standard solution of potassium ferrocyanide.[4] When the zinc content of the solution is known one can calculate the consumption of 0.1 N sodium hydroxide owing to zinc and hence the amount of sodium in the sample. If the sample contains "A" gram zinc, the consumption of 0.1 N sodium hydroxide corresponding to this amount of zinc is $\frac{1000 \times A}{0.1 \times 32.7}$, where 32.7 is the equivalent weight of zinc. The results are presented in Table I, from which is seen that the method gives sufficiently accurate values, the mean relative error being less than 3 per cent for the alkali metal.

Table I

Solution No.	Grams per liter Mn	Zn	Na	Grams per liter found Mn	Zn	Na
1	6.74			6.83 6.70		
2		8.01			7.88	
3		8.01	10.21		8.00	9.95
4		6.85	8.72		6.90	8.40
5		8.01	14.80		8.07	14.43

The types of solutions were:

Solution No. 1 manganese phosphate without accelerator.
Solution No. 2: zinc phosphate without accelerator.
Solution No. 3: zinc phosphate with $NaNO_3$ as accelerator.
Solution No. 4. zinc phosphate with $NaNO_3 + HNO_3$ as accelerator.
Solution No. 5 zinc phosphate with $NaClO_3$ as accelerator.

Discussion

The method outlined here is very rapid and convenient for the determination of the metal content of phosphating solutions, since both sodium and manganese, as we know, are very difficult to analyze. Especially, the method seems to be useful in the manufacturing control of concentrated phosphate solutions (from which phosphating baths are prepared by dilution with water).

It must be pointed out that the supposition for the ion exchange method is that the phosphates of the heavy metals are primary phosphates. For, supposing that in a zinc phosphate solution secondary zinc phosphate is present, the reaction during the passage of the cation exchange resin is:

$$ZnHPO_4 + 2RH = H_3PO_4 + R_2Zn$$

When primary zinc phosphates contact the resin layer the following reaction occurs:

$$Zn(H_2PO_4)_2 + 2RH = 2H_3PO_4 + R_2Zn$$

When titrating the effluent, the consumption of sodium hydroxide should be twice as much in the latter case than in the former, because two molecules of phosphoric acid are formed by the reaction of one molecule of primary zinc phosphate with the ion exchanger but only one molecule of phosphoric acid by the corresponding reaction between secondary zinc phosphate and the ion exchanger. However, it is a fact that in the phosphating solutions salts of the heavy metals are primary phosphates, the hydrolysis to secondary and tertiary salts being prevented by the free phosphoric acid present. Moreover, the secondary and tertiary phosphates of the heavy metals are only slightly soluble (with the exception of secondary zinc phosphate) and precipitate when formed. From another point of view the fact that the ion exchange method outlined here gives very accurate results for the determination of manganese and zinc is a proof that these metals are present as primary phosphates in phosphating baths.

Except for manganese and zinc, the metals present in phosphating baths are generally sodium and iron. In accelerated solutions, i.e. solutions containing sodium chlorate or nitrate, the ferrous ions are immediately oxidized to ferric ions and precipitate. It is, therefore, in unaccelerated solutions (usually manganese phosphate baths) that iron is present in considerable amounts. In this case it is necessary to determine the iron content separately (e.g. colorimetrically), after which the percentage of manganese can be calculated from the titration values, as has been shown above.

Estimation of Errors in the Analysis

The maximum relative error for the titration of phosphoric acid with 0.1 N sodium hydroxide, using methyl orange as indicator, may be estimated to be 1 per cent, as the color change of the indicator is not very sharp. In a phosphating bath without accelerator the maximum relative error therefore, is 2 per cent for the determination of zinc and manganese respectively, as the calculation is based upon the difference between two titrations. In accelerated zinc phosphate solutions, zinc is determined independently through a spot test titration with potassium ferrocyanide. If the titration error in this case is, at most, 1 per cent, the maximum relative error in the determination of sodium in phosphating baths is 3 per cent, since the calculation is based upon the difference between three titrations. This accuracy is completely satisfactory in the analysis of phosphating solutions and is probably at least as accurate as the results which would be obtained with other analytical methods.

Summary

1. A method has been developed for the determination of the metals present in phosphating solutions.

2. The analysis is performed in the following manner:

For concentrates: 3-4 ml. are weighed accurately and diluted to 100 ml. with distilled water.

For phosphating baths: the solution need not be diluted.

10 ml. of the diluted concentrate or of the phosphat-

(*Concluded on page* 69)

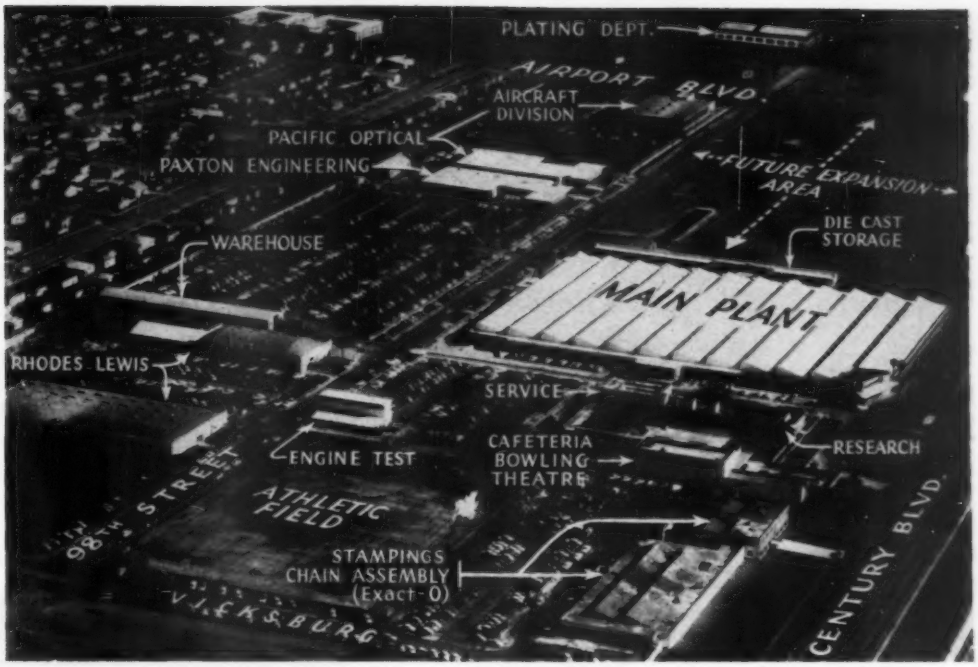


Figure 1. McCulloch Motors Corporation main plant, other divisions and facilities. Across Century Blvd., to right, is the Los Angeles International Airport.

Chromium Plating Die-Cast Aluminum Engine Cylinders

By **Fred M. Burt**, *Los Angeles, Cal.*

WITH the purchase of the Surface Alloys, Inc., plant and ground, *McCulloch Motors Corp.*, has added another outside department to the many facilities close to the large 400,000 sq. ft. main plant. (Fig. 1.) The plant, with about 37 employees, is now known as the *McCulloch Motors Plating Department* and is housed in an 18,000 sq ft. modern building; well-equipped for hard chromium, copper, zinc, cadmium and plating on plastics.

Currently, units produced in the largest numbers in the main plant are lightweight gasoline engines, with die-cast aluminum cylinders. The #4-30 engine (4-hp and 30 lbs. wt.) is used to power the smaller chain saws; the #7-55 (7-hp, 55 lbs.) for the larger chain saws, for the Earth-Drill and for the 18,000 gph pump: also, a special engine to power aircraft for target use, a four cylinder engine, developing more than 70-hp but weighing only 78 lbs. As the company is the world's largest manufacturer of chain saws, engine production runs into several thousand per month.

Engine cylinder walls are chromium-plated directly on the aluminum to accomplish many desirable purposes. In eliminating the cast-iron cylinder sleeve, it lowers production costs, cuts down on weight, improves engines' heat dissipation and increases power output through reduced friction. These engines in the field have now demonstrated the success of the process to a point where other engine manufacturers are beginning to investigate its possibilities.

Besides the hard chromium plating of cylinder walls, another fully automatic operation applies chromium deposit directly to the steel saw cutter teeth. Steel gauges and center main bearing cages (aluminum) are chromium plated in still tanks. Power saw accessories, such as handle bars and blades, are bright zinc plated for corrosion protection and for decorative purposes to heighten sales appeal. Nuts, bolts and screws are cadmium plated. In the case of connecting rods and blades, copper plating is employed as a stop-off for carburizing (or heat-treat hardening) on metal surfaces that must remain soft. Only machine surfaces where the steel is exposed will harden in the heat-treat process.

Rough-machined connecting rod forgings, on their first trip to the plating department, are stripped of scale in a pickling bath and copper plated on all surfaces. Machining of the rods on bearing and other surfaces exposes these surfaces to the hardening effect of heat treating, while the thin copper layer on unmachined surface prevents these areas from hardening along with the rest of the part.

Using the drawing, the layout of tanks and other units with their numbers as a guide, the operations, in general, are as follows.

On each of the two automatic cutter tooth machines, there are 24 paddles, made of aluminum, with a copper lead down the center to magnetize the transverse

Figure 2. In foreground is one of two machines for hard chromium plating of cutter teeth; beyond is cleaning line and still tanks for chromium plating of center main bearings, gauges and other miscellaneous parts.

steel strips that hold the cutter teeth in place, 12 to the paddle (Fig. 2.) These paddles carry the teeth through the different tanks as follows:

C1 — Alkali cleaner at 160°, (25 gal. tank)
C2 — Cold water rinse
C3 — 50% HCl acid dip, (10 gal.)
C4 — Cold water rinse
C5 — Chromium tank, using standard 33 oz. chrome solution (225 gal.)
C6 — Cold water rinse

The acid cleaner is changed daily, while the chromium tank is checked twice weekly. The whole cycle requires about 30 minutes with 20 min. in the chromium tank. (Chromium plating is the slowest, building up at the rate of about 0.001″ per hour; copper, zinc and cadmium deposits are produced at a rate of from 0.002″ to 0.003″ per hour.) Each machine will turn out up to about 1200 plated teeth per hour.

Figure 3. View in copper-zinc-cadmium plating department (taken from mark "X" on drawing). In background are saw blades that have been zinc plated. Note method of handling stacks of these blades by lift truck.

Other tanks in the area for still chromium plating, using standard solution:

E1 — Six feet deep
E2, E3, E4 and E6 — 5 feet deep
E5 and #7 — 24″ deep for chromium plating of gauges.

D1 is a cleaner tank, with D3 and D6 cold water rinse. D4 is a 48″ x 33″ x 4 ft. deep reverse current electric strip tank.

The "B" tanks are as follows:

1 — Alkali cleaner
2 — Water rinse
3 — Chromic acid pickle

Figure 4. Copper plating of connecting rods on the wrist pin end only, is controlled by hanging the rods with copper wires, allowing only a portion of the part to be immersed in the copper plating tank (F10). Adjusting the wires are the plater and his helper. In the background, a saw blade has been drawn out of the bright zinc tank for inspection.

4 — Nitric acid dip
5 — Water rinse
6 & 7 — (Same as 3.) A special solution for processing aluminum to enable satisfactory direct application of chromium plating (formula not divulged).
8 — Zinc dip
9 — Chromate tank (standard process). The treating of aluminum parts — drone engine and water pumps — provides salt water corrosion resistance. This chromate treatment is a 1 to 3 minute immersion.

A3 is a standard phosphoric electro-polishing bath. Other "A" tanks are for storage or out of use. In the corner is a solvent degreaser. In the still chromium tanks, besides plating center main bearing cages of aluminum, and gauges of steel, gears and crankshafts

are plated, also tooling, dies, etc., are built up with hard chromium for the tool department in the main plant.

Beyond the next room, which houses motor generator sets, rectifiers, voltage regulators and power panel, is a copper-zinc-cadmium department (Fig. 3). Tanks are as follows:

F1 — Electrocleaner, caustic-soda ash, ratio 1:4
F2 — Hot water rinse, 180°F.
F3 — Electrocleaner (same as F1)
F4 — Cold water rinse
F5 — 50% HCl dip
F6 — Water rinse
F7 — Copper strike (copper cyanide, sodium cyanide, caustic soda, and soda ash)
F8 — Cadmium plating, standard solution
F9 — Copper plating (Fig. 4), standard solution
F10 — Same as F9
F11 — Zinc plating, standard solution (Fig. 5)

Figure 5. At the left is a portable, continuous filter, hooked to one of the zinc tanks.

F12 — Water rinse
F13 — Water rinse
F14 — Bright zinc dip, standard solution
F15 — Electro-strip, chromium from aluminum; H_2SO_4 — water, 1 to 7 ratio
F16 — Water rinse
F17 — Water rinse
F18 — Hot water rinse, 180°F.
F19 — Acid strip, 50% HCl

The line-up on the cadmium barrel line —

G1 — Alkali soap cleaner, room temperature
G2 — Water rinse
G3 — 50% HCl dip
G4 — Water rinse
G5 — Sodium cyanide dip (4 oz./gal.)
G6 — Cadmium plating, standard solution
G7 — Water rinse

The biggest and most particular of all the operations

Figure 6. In foreground is automatic aluminum alloy preparation machine, with the automatic plating machine beyond it. Note clock, with large second-hand, in rear, used for reference in timing preparation cycle. Ed Ward, lead man, second from right. In full production, operations will handle ten #430 engine cylinders, eight #755's, and two #4318 (drone) cylinders at a time. The center main bearings receive the same preparation treatment but are plated in still tanks for about 0.0025" thickness (2½ hours). In room at right is the rectifier, timing and control devices.

is the plating of engine cylinder walls, using the automatic aluminum alloy preparation machine, (Fig. 6) followed by the automatic cylinder chromium plate machine. In the closely timed cycle of dips, rinses and immersions on the preparation machine lies the secret of McCulloch's success in the chromium plating of cylinder walls. This manual operation requires about 5 minutes' total time, with the different cylinders and center main bearings being carried in special dipping fixtures up to ten at a time. The succession of tanks is as follows:

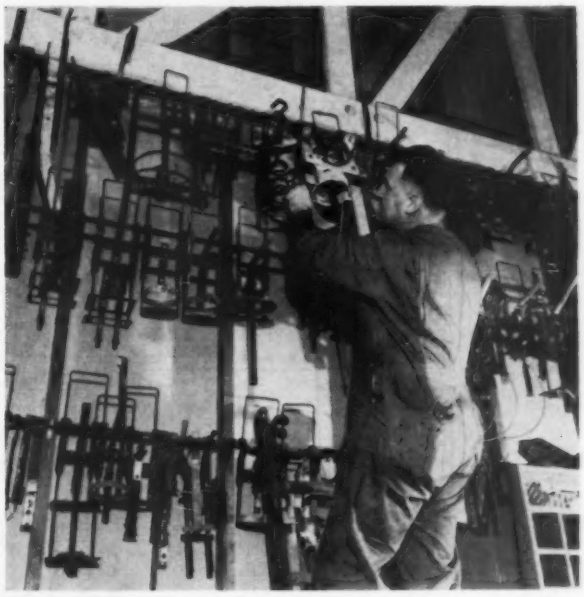
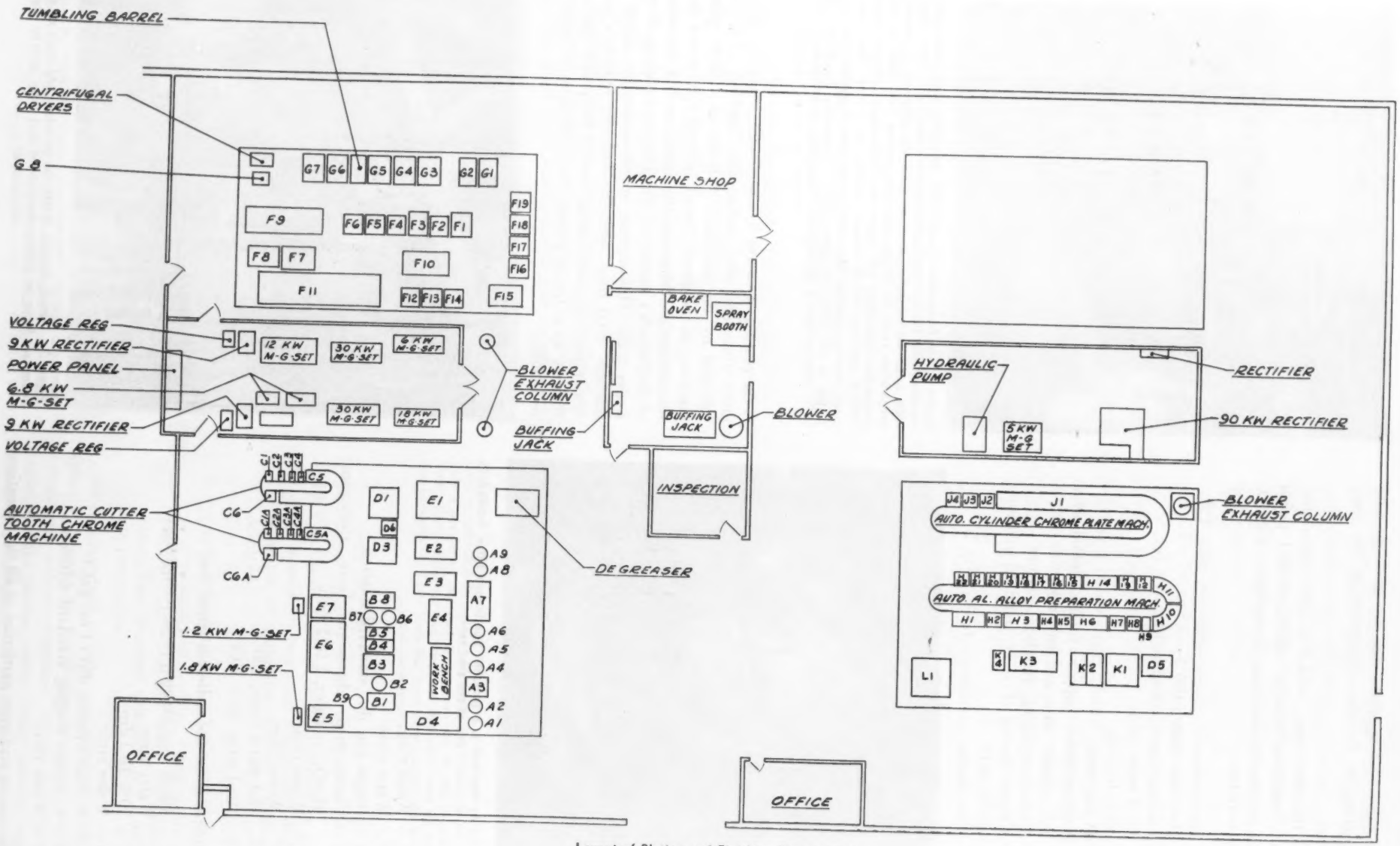


Figure 7. Plating fixtures, mostly for cylinders, and made of aluminum, are hung on plating department tool room wall by maintenance man.



Layout of Plating and Finishing Department.

H1 — Alkaline cleaner, 150°F.
H2 — Water rinse
H3 — Same as H1
H4 — Water rinse
H5 — Water rinse
H6 — Chrome pickle at 150°; chromic acid and H_2SO_4
H7 — Water rinse
H8 — Water rinse
H9 — Nitric acid etch
H10 — Water rinse
H11 — 50% nitric acid dip
H12 — Water rinse
H13 — Water rinse
H14 — Zinc immersion, zinc and caustic soda solution
H15 — Water rinse
H16 — Water rinse
H17 — 50% nitric acid dip
H18 — Water rinse
H19 — Water rinse
H20 — Same as H14
H21 — Water rinse
H22 — Water spray under which cylinders are left until ready to be placed on plating machines

On the plating machine there are 60 arms that hold the special fixtures designed to hold the different size cylinders for hard chromium plating of the cylinder bore only. Fixtures for the smaller cylinders hold two units, one cylinder below, then a spacer, and the second cylinder above. Fixtures for the drone engine cylinders carry single units.

First is J1 — 1800 gal. tank with standard chromium solution (33 ozs./gal.) followed by rinse tanks. The speed is automatically controlled to apply the desired thickness of deposit which can be applied up to 0.005". In actual practice, it runs from 0.0015" on the #430 cylinders, 1 hour and 45 minutes' plating time, to 0.0035" thickness on the drone engine cylinders, 3 hours and 30 minutes. In actual constant production, about 30 of the smaller cylinders, 20 of the #755's and 15 of the drone engine cylinders are plated hourly.

A 12 volts and 7500 amperes rectifier was specially built for this plating machine. It has automatic adjustment of the voltage for resistance from the number of cylinders on the machine.

The K3 tank in this area is an electropolishing unit, while the others are principally storage tanks, with pumps and interconnected piping; just outside the building is an ion exchanger for removal of aluminum from all chromium plating solutions. All of these tanks have pipe and pump connections so that their contents can be pumped to the three large cylindrical storage tanks outside. The solution is pumped from these tanks through the deionizing operation and into an evaporator to remove excess water to bring it down to 38 oz./gal. of chromium solution. This is checked and controlled by *Ed Ward*, lead man on the chromium side, through a specific gravity test.

Norman Steubner is production supervisor of this plating division, which operates around-the-clock with three shifts. *Kargus "Scotty" Scott* is maintenance man, who keeps the plating fixtures and other equipment ship-shape and in order (Fig. 7).

METALS IN PHOSPHATING SOLUTIONS

(*Concluded from page 64*)

ing bath respectively are titrated with 0.1 N sodium hydroxide against methyl orange as indicator. Another sample of 10 ml. of the diluted concentrate or of the phosphating bath are passed through a layer of a sulfonic cation exchanger in the hydrogen form (height and diameter of the resin layer are 150 mm and 9.8 mm respectively); the resin layer is afterwards washed with about 50 ml. distilled water. Flow rate during filtration and washing is 4-5 ml. per min. The combined filtrate and wash water is titrated with 0.1 N sodium hydroxide to the methyl orange endpoint. From these titrations the total metal content in the sample can be determined, as described previously. In the case of unaccelerated solutions the manganese and zinc are by this means determined directly. As to accelerated solutions, the percentage of one of the metals present must be determined independently with another method of analysis, after which the other metal (usually sodium) can be estimated as described above.

3. The method outlined here seems to be very rapid and convenient for the control of phosphating baths and concentrated phosphate solutions, especially for the determination of manganese and sodium, the analysis of which is, as we know, rather difficult and time-consuming. Another advantage is that, in the eluate from the ion exchanger, the amount of phosphoric acid can be determined very simply.[1]

4. The method is of sufficient accuracy for phosphating baths and concentrated phosphate solutions, the maximum relative error being 2 per cent in the case of unaccelerated solutions and 3 per cent in the case of accelerated solutions.

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Growth of Parallel Grooves on Soluble Anodes by Electrolysis

By Toshio B. Horiuchi, *Applied Physics Section, Fujuhara Memorial Faculty of Engineering, Keio University, Tokyo, Japan*

Introduction

ON the surface of soluble metal anodes such as copper, brass and iron, parallel grooves, hollows, and constrictions, as shown in Figure 1, are formed during high voltage and high current electrolysis. When the anode is a cylindrical rod the number of the grooves has a certain relation to the diameter of the rod as shown in Figure 2, and it is found that the intervals of the grooves are nearly equal. Some qualitative experiments on these phenomena are described in this article. The present experiments were chiefly performed with brass rods and plates as the anode, but the same qualitative results are obtained with other soluble metal anodes.

Experimental Apparatus

The experimental apparatus is shown in Figure 3. A pair of series-connected electrolytic cells were used to compare the effects of the treatment on the anodes during the same electrolytic condition; for example, as shown in Figure 5, an anode attached with a different shape of Bakelite plate was electrolyzed in each cell. The electrolytic solution is 1 N aqueous H_2SO_4. Of course, the concentration changed successively during the electrolysis. The power supply consisted of batteries.

Action of Oxygen Bubbles

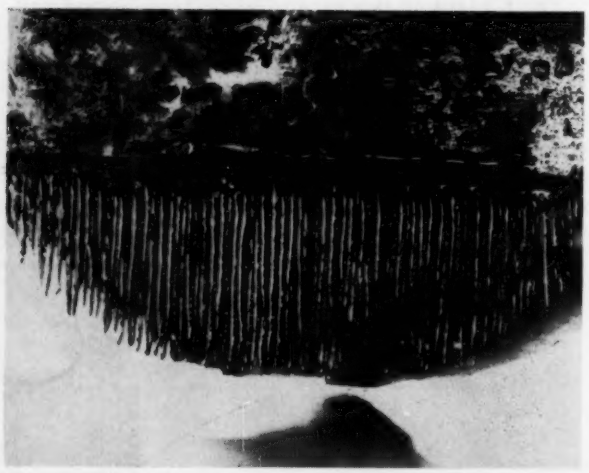
At first, it was considered that the grooves appeared due to the nonhomogeneity of the material. This might be possible because of strain caused within the material by machining, the strain pattern becoming visible in the course of electrolysis. To test this possibility, an annealed brass anode was electrolyzed but the same phenomena were observed on the surface of the anode. Moreover, as shown in Figure 4, on the surface of the curved rod the grooves formed vertically. Therefore the growth of the grooves cannot be connected with the material itself; there should be some difference in the condition of dissolution between the edges and the bottoms of grooves. As a clue to this problem, the following facts were observed:

a) The grooves do not grow during electrolysis at low voltage in which no oxygen bubbles appear, and they grow only in case where oxygen bubbles appear.

b) The bubbles ascend along the bottoms only and never along the egdges.

c) Slight grooves begin to appear several minutes

Figure 1. (a) Brass rod anode. x 5.5.



(b) Brass plate anode. x 2.5.

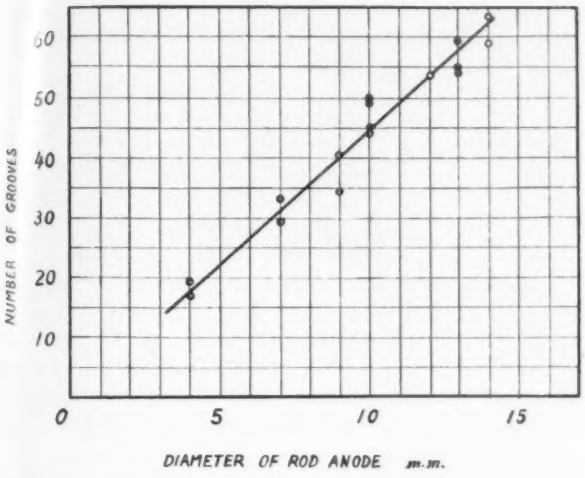


Figure 2. The relation between the number of the grooves and the diameter of rod anode.

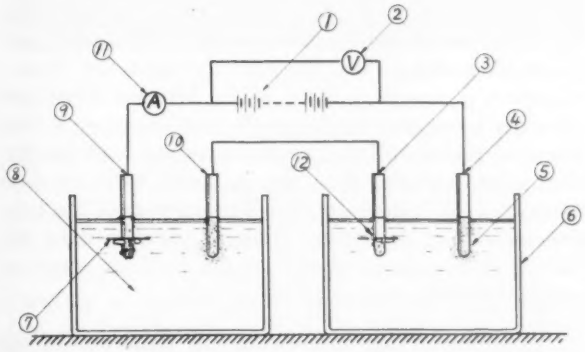


Figure 3. Experimental apparatus. (1) Batteries. (2) Voltmeter. (3) 9) Anodes. (4) 10) Cathodes. (5) Powder deposition. (6) Glass electrolytic cell, 35x28x28 cm. (7) Bakelite plate. (8) Solution, 1 N H_2SO_4 aq. (11) Ammeter. (12 Ascending bubbles through holes.

after the current is turned on and become conspicuous with elapsed time. When the conspicuously grooved anode was electrolyzed under the conditions in which oxygen bubbles do not grow, the grooves become slight with the time lapse.

From the facts mentioned above, it is clear that the action of the oxygen bubbles is very important to the phenomena. In connection with action of the bubbles, the following experiments were performed:

d) To ascertain whether the oxygen bubbles dissolve the anode directly, the anode with oxygen bubbles attached on its surface was electrolyzed under the conditions in which no new oxygen bubbles appeared. Then it became clear that the oxygen bubbles have no direct effect upon the anode but rather act as an insulator.

e) To confirm the observation in b), a rod anode was employed with Bakelite plate attached at its middle as shown in Figure 5 a) in order to prevent the bubbles from ascending along the surface of the anode beyond it. Under these conditions the conspicuous grooves grew on the surface beneath the plate only. On the contrary, when a plate with holes which allowed the bubbles to ascend along the surface of the anode in various places was used as in Figure 5 b), the grooves extended to the upper part of the anode only where the bubbles could ascend through the holes, as in Figure 6. In both cases, the growth of the large hollows is very noticeable where the bubbles stagnate. Accordingly, it is clear that the action of the bubbles causes the growth.

f) When the anode is conical, the depth of the grooves grow uniformly but, when the anode is shaped hemispherically, they do not grow in uniform depth, as shown in Figure 7. Here it is clear that the grooves are formed by the action of the ascending bubbles which impose pressure on the surface of the anode.

Observation of Ink Flow

To explain the effect of the bubbles which ascend on the surface of the anode imposing a pressure, the following experiment was performed: a glass plate was inked on one surface, dried, and some small oil balls placed on the inked surface. When this plate was dipped in non-agitated water, the ink began to dissolve and flow down along the glass surface. The effects of the oil ball on the flow was observed. As shown in Figure 8, the concentration of the ink is lower just under the oil balls. Similarly, it is reasonable to think that the concentration of the metal ion in the solution is lower along the loci of the oxygen bubbles.

In consequence, along the locus where the bubble has ascended, the concentration gradient of metallic ions is greater than other parts so that the metal is dissolved there to a greater extent accompanying the growth of bubbles and the grooves are formed along the loci. After the growth of slight grooves in any part of the anode, the bubbles ascend along them, make them deeper, longer, and at the same time the growth of oxygen bubbles is greater along them.

From the results of the investigation, it is certain that the growth of the grooves depends upon the "gutter-cleaning" action of the oxygen bubbles. The

Figure 4. Vertical grooves of curved rod anode. x 3.

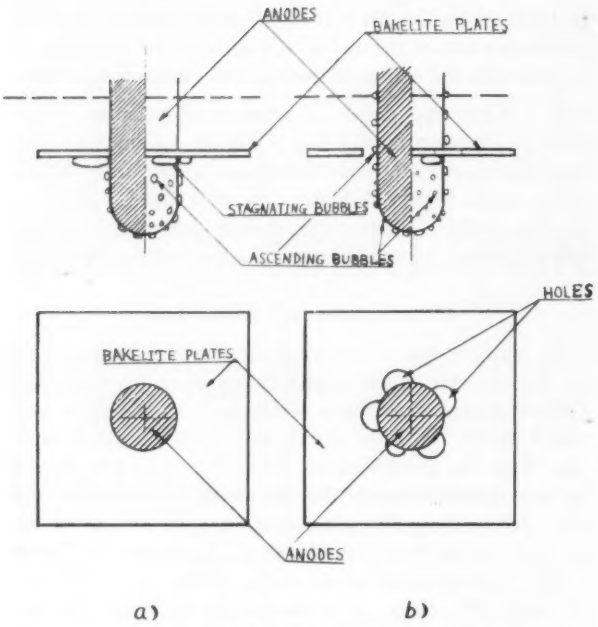


Figure 5. Two kinds of bakelite plate and ascending bubbles.

phenomena, then, are not only concerned with dissolution of the metal by electrolysis but with the dissolution of any material which generates the bubbles. To verify this postulation, a marble block was dissolved in 30% HCl solution and similar parallel grooves were found to grow on the surface as shown in Figure 9. But, in this case, the grooves are not so conspicuous and the interval is shorter than that of the brass anodes. This will be discussed later.

The above should be sufficient explanation for the growth of the grooves, but another important problem still remains; how to account for the first growth of the slight grooves which become conspicuous later with almost equal spacing one from the other? The growth of oxygen bubbles should be at random and they can ascend haphazardly. They would not ascend with a purpose to make the parallel and equal interval grooves later; so the dissolution of the anode should be uniform.

Then, an anode grooved by a file at random was electrolyzed. But the formation of grooves was independent of the former grooves; the filed grooves almost vanished before the growth of the grooves formed by bubbles. To examine this action, the ascending bubbles were observed on the surface of the anode where no groove has yet grown. Figure 10 comprises a schematized illustration made from the photographs taken at arbitrary instants before the growth of the grooves. From the observation of the illustrations, it will be seen that the bubbles ascend only along the lines which become the bottoms of the grooves later and the lines are almost in equal intervals.

About this arrangement of the bubbles, König's theory on the pattern of the powder in the Kundt's tube is available. In short, as shown in Figure 11, a pair of bubbles ascending a short distance side by side pull each other but, when they are brought too closely together, a repulsive force arises between them and they are separated. Therefore the bubbles grow at random, or rather uniformly, cannot ascend haphazardly, but must perform the "march past" with constant interval as in Figure 10 (a). The interval of the bubbles ascending in regular order is determined by the size and ascending velocity of the bubbles, viscosity of the solution, etc.

According to our observation, the diameters of the bubbles are almost always the same so that they keep the same velocity according to Stokes' law, also in regular order, or the same interval. This lineup of the interval is kept all the time for the reasons discussed previously and the grooves become visible after several minutes. The bubbles can be in regular order only when there is no agitation of the solution by external forces. Therefore, rotation of a rod anode around its axis prevents the growth of the grooves.

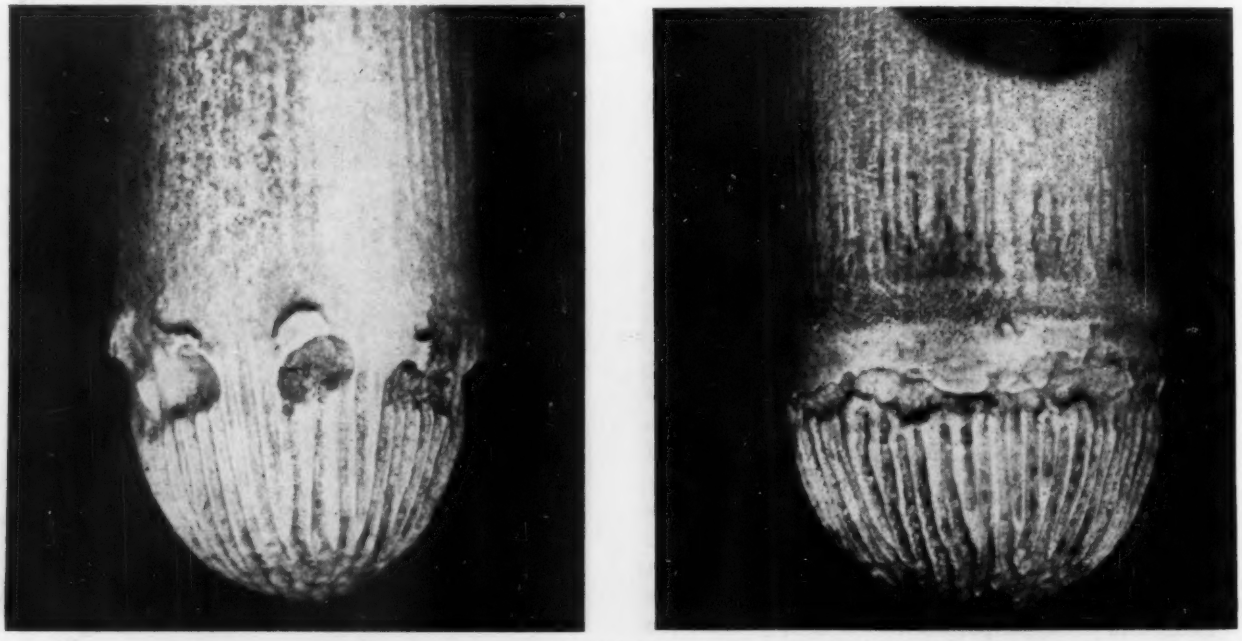


Figure 6. Comparison of two anodes. Both are attached with bakelite plate, but the plate of the left anode has holes. x 3.

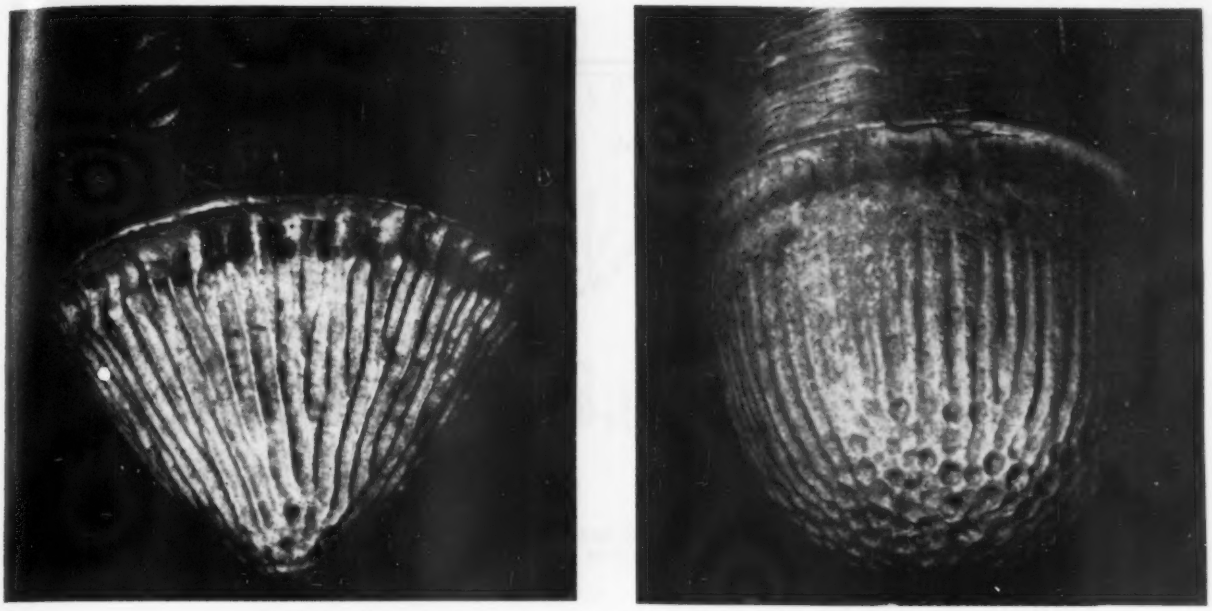


Figure 7. Comparison of grooves on conical and hemispherical anode. x 3.5.

To verify further the previous investigation concerning the arrangement of the bubbles, brass plate anodes were inclined at various angles and the intervals of the grooves, which should be influenced by the size of the bubbles, were measured. As in Figure 12, the interval of the grooves increases in accordance with the increasing inclination angles, as measured in the figure, and no grooves grow when the inclination angle is larger than about 60°. In this range of angles, the grooves are substituted by hollows. The same result is obtained for marble dissolution, which is also shown in Figure 12 by dotted line.

Contrast of the Grooves

The contrast of the grooves is also affected by the inclination angle, as shown in Figure 7, and also by the characteristics of dissolution or, in other words, by the state of the anode surface. The dissolved surface of the brass anode is not smooth according to the disintegration of the brass or copper oxide powder. On the contrary, in the case of the marble, no disintegrated powder is observed and the surface is very smooth. And in case of the pure metals such as copper, the disintegrated copper oxide powders are only one-tenth of a micron in size, in addition to which the anode surface is very smooth. So, in the latter case, very fine bubbles can ascend and very fine grooves grow.

Film of Bubbles

The growth of the hollows and the constrictions are rather connected with the motion of thin films such as that of soap bubbles. Bubbles in liquid are somewhat similar to that in vapor; the bubbles in liquid are also surrounded by thin films which move in a complicated manner. For example, the films are always in motion even when the bubbles stagnate, and the phenomenon is observed by the motion of the dust or the disintegrated powder on the film. It is considered that, by the movement of the film, the quiescent bubbles exert the same effects against the anode as the moving

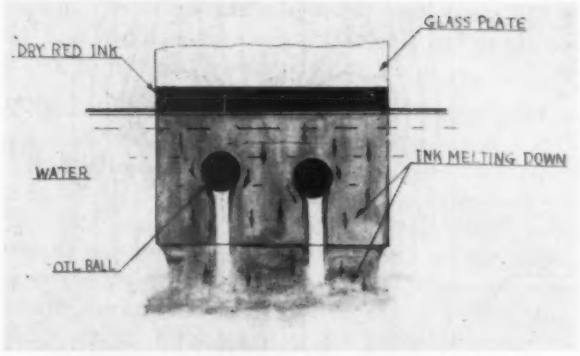


Figure 8. Flow of ink over a glass plate surface. x 3.

Figure 9. Grooves grown on the surface of marble block. Celluloid replica. x 2.

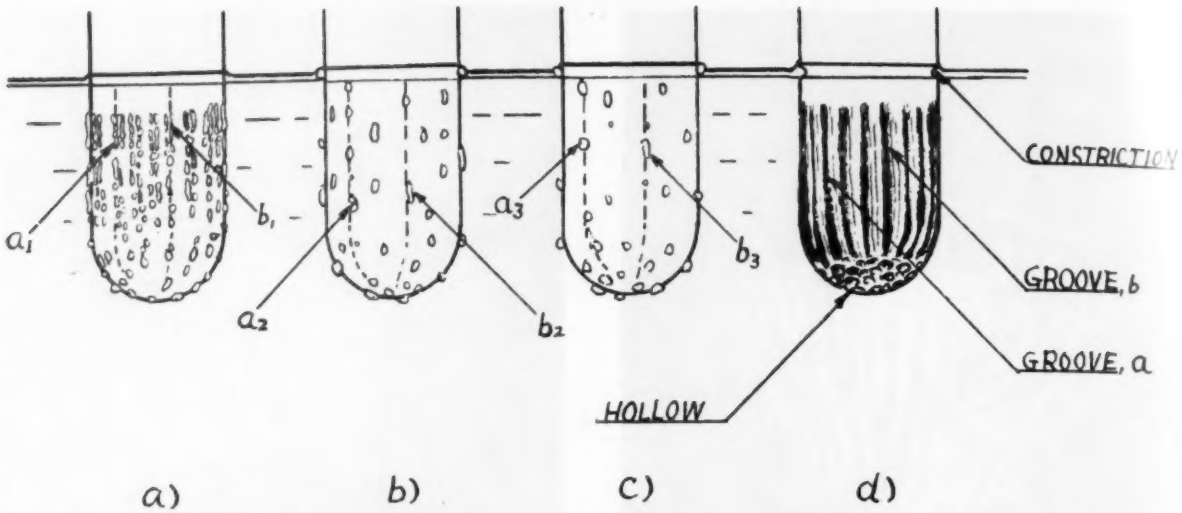


Figure 10. (a) Ascending bubbles at instant when the current is turned on. The small bubbles ascend in regular order. (b) c) Ascending bubbles at an arbitrary instant. They keep the lines which become the grooves later as shown in (d).

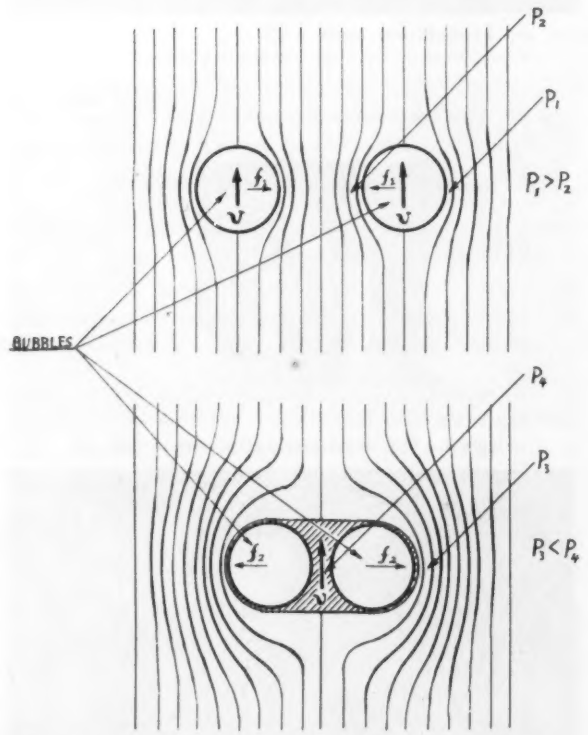


Figure 11. Interaction of two bubbles moving at a velocity v. F_1 and f_2 are attractive and repulsive forces respectively.

bubbles. But further investigation and experiments will be necessary.

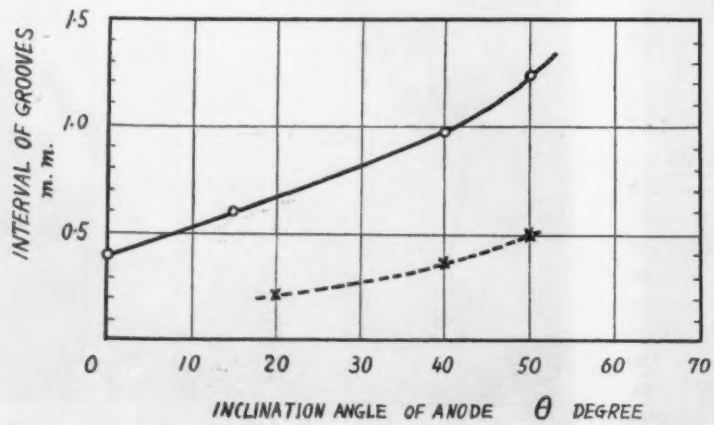
Conclusions

The conclusion is that the grooves are formed, first by the bubbles of the same size which grow at the lower part of the anode and are large enough to begin ascending by themselves and to sweep away the smaller bubbles on the upper surface of the anode. They ascend in the order of the "march past." Then the grooves become emphasized by the "gutter-cleaning" action of the oxygen bubbles. The constrictions and the hollows are both formed by the movement of the films of solution between the anode and the bubbles. The growth of the grooves and other phenomena disappear during electrolysis if not accompanied by bubbles, or when the solution is agitated.

These phenomena are not restricted to the case of electrolysis only, but are applicable in the dissolution of any matter which accompanies the growth of the bubbles, as in the case of erosion of steam boilers by steam bubbles.

Acknowledgments

Finally the author wishes to express his deep gratitude to Professor M. Mashima, Professor F. Kito and his colleagues to whom he has turned for advice and discussions.



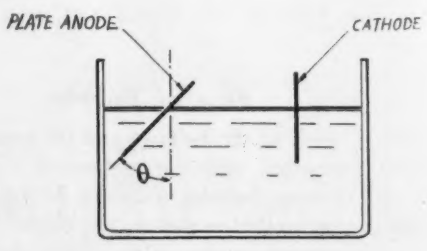


Figure 12. The relation between the interval of grooves and the angle of anode inclination. Dotted line shows the relation for marble.

Electrodeposition of Copper from the Monoethanolamine Bath

By T. L. Rama Char and N. B. Shivaraman, *Electrochemistry Laboratory, Indian Institute of Science, Bangalore, India*

Introduction

SOME attempts have been made to evolve a substitute for the commercial cyanide bath used in the electrodeposition of copper in view of its poisonous nature, instability, and low current efficiencies. Work has been done on solutions like thiosulfate, iodide, thiocyanate, amine, oxalate, tartrate, sulfamate, pyrophosphate, thiourea, fluoborate.

The electrodeposition of copper from complex solutions containing mono-, di-, and triethanolamines has been studied by Brockman and co-workers,[1,2,3] Schweig,[4] and Levin.[5] The present investigation formed part of the general program on the electrodeposition of metals and alloys from cyanide-free baths. In a previous communication from this laboratory,[6] it has been shown that the silver iodide bath gives satisfactory deposits of silver. The electrodeposition of copper and brass from the ethanolamine baths has been briefly reported in preliminary notes by Rama Char and coworkers.[7-9] This paper describes in detail the work on the deposition of copper from monoethanolamine solutions. Electrodeposition from di- and triethanolamine baths will be reported in subsequent papers.

The Plating Bath

When 1 ml. of monoethanolamine was added to 1 g. of copper oxalate suspended in water, a clear blue solution was obtained indicating the formation of a complex. The salt:amine ratio remained the same at all concentrations. The concentration of copper oxalate in the bath was in the range 15-120 g./l. (6-48 g./l. of copper). These solutions are simpler than those attempted before.

Experimental

The monoethanolamine (technical) and copper oxalate were of the British Drug House make. The other chemicals were made by British Drug House or Merck. The amine had a specific gravity of 1.019 at 24°C. It had a strong smell of ammonia and its pH was 13.75. It distilled off completely at 170°C.

The cathodes were cut from a mild steel sheet of $\frac{1}{32}$ in (0.08 cm.) thickness. Each cathode was 1 in. x 3 in. (2.5 cm. x 7.5 cm.) and submerged to a depth of 2 in. (5 cm.) in the bath, the submerged electrode surface area being 4 in.^{2} (25 cm.^{2}). Two Canning's rolled copper anodes of the same dimensions as the cathode were used, at a distance of 0.75 in. (1.9 cm.) on either side of the cathode.

Rust, scale, and other oxides were best removed by pickling the cathodes in hot (60°C.) dilute hydrochloric acid (1:1). The cathodes were dried after cleaning with water, and then rubbed with smooth emery. They were further cleaned by cathodic treatment for about 1 min. in a hot alkaline bath containing: trisodium phosphate 100 g./l., sodium carbonate 80 g./l., and sodium hydroxide 20 g./l., at 6 amp./dm.^{2} and 6-8 volts. The cathodes were finally rinsed in water and alcohol, dried, and kept in a desiccator for use.

The experiments were carried out in 100 ml. beakers. The plating time was 2.5 min. and the temperature 24°C. The rest of the experimental procedure was the same as described before.[6]

Experimental Results

Copper Ion Concentration

The copper (cupric) ion concentration in the plating solutions was determined by the emf method and was of the order of 10^{-11} to 10^{-13} *N*. The addition of 60 g./l. rochelle salt decreased the metal ion concentration of the bath 60 g./l. copper oxalate, 60 m./l. amine from 1.90×10^{-11} to 3.16×10^{-13} *N*, indicating that further complexes are formed. In the cuprocyanide bath the cuprous ion concentration is of the order of 10^{-30} *N*. The ethanolamine solutions did not deposit copper on steel by chemical displacement due to the low metal ion concentration.

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TABLE I

*p*H: 9.15–9.20

Copper oxalate g/l	Amine ml/l	C.D. amp/dm²	Bath tension volts	Cathode efficiency %	Appearance of electrodeposit
15	15	0.4	2.5	96	Bright
		0.6	3.8	93	Bright
30	30	0.8	8.1	96	Nonuniform
		1.2	5.2	100	Fairly bright
		1.6	6.7	93	Bright
		2.0	9.6	93	Partly burnt
45	45	0.8	2.5	90	Nonuniform and dull
		1.6	5.3	93	Dull
		2.0	7.5	94	Fairly bright
		2.4	8.4	98	Partly burnt
60	60	2.4	4.3	90	Dull
		3.2	5.5	95	Fairly bright
		4.0	6.9	91	Bright
		4.8	9.2	90	Bright
75	75	2.4	4.5	95	Dull
		3.2	5.2	93	Fairly bright
		4.0	8.5	91	Bright
		4.8	10.2	90	Bright
90	90	2.4	4.0	90	Dull
		3.2	4.8	98	Dull
		4.0	5.7	100	Fairly bright
		4.8	6.7	94	Fairly bright
		5.6	9.0	93	Bright
		7.2	10.0	90	Burnt
120	120	4.8	5.2	86	Dull
		6.4	7.2	90	Fairly bright
		8.0	10.0	90	Bright

ELECTRODEPOSITION

Variation of concentration.—Electroplating was carried out over a wide range of concentration and current density and the results obtained are given in Table I.

The cathode efficiency ranged from 86 to 100 per cent and was 90 per cent and above in the bright C.D. range. The plating range for good deposits was from 0.4-8.0 amp./dm.^{2} Increase in the concentration of metal (complex) increased the limiting C.D. for bright deposits. But, at concentrations above 90 g./l. of copper oxalate the bath tended to crystallize out and the anode corrosion was not good at high C.D. In view of the dragout losses and the fact that a decrease in the metal ion concentration causes finer grained deposits, it was not advisable to raise the copper concentration above 24 g./l. The optimum concentration was that of the bath containing copper oxalate 60 g./l. and amine 60 ml./l. (60:60). The bath voltage, ranging from 2.5-10.2 volts, was rather high as compared with the cyanide bath. The deposits were treed at high C.D. The adherence of the electrodeposits to the base metal, as found from bending and breaking tests, was good. Addition of 10, 30, and 60 ml./l. of excess amine to the optimum concentration bath did not improve the quality of the deposit.

Rochelle salt bath.—It was found that the addition of rochelle salt as one of the constituents of the bath considerably improved its performance. Rochelle salt facilitated anode corrosion by preventing blackening of the anodes at high C.D.; reduced the bath voltage and minimized the fluctuations in voltage and current; increased the C.D. range, conductivity, cathode polarization, and throwing power; and yielded better quality deposits by eliminating treeing and increasing the brightness. It also reduced the copper ion concentration. Table II gives the results with the rochelle salt bath.

Even at high concentrations, copper oxalate 120 g./l., amine 120 ml./l., rochelle salt 120 g./l. (120:120:120), the bath did not crystallize out at room temperature. The optimum concentration was 60:60:60. The deposits were brighter than those obtained from the rochelle salt-cyanide bath. There was no change in the bath performance on allowing the bath to age for a period of 4 months. It was possible to go up to 10.0 amp./dm.^{2}

Temperature.—Higher temperatures were not conducive to the good working of the bath with and without rochelle salt.

Addition agents.—In order to see whether the rochelle salt-amine bath could be further improved,

TABLE II

*p*H: 9.4–9.7

Copper oxalate g/l	Amine ml/l	Rochelle salt g/l	C.D. amp/dm²	Bath tension volts	Cathode efficiency %	Appearance of electrodeposit
30	30	30	0.8	2.2	100	Dull
			1.2	2.7	97	Bright
			1.6	3.4	90	Bright
			2.0	4.1	88	Bright
30	30	60	0.8	1.8	96	Dull
			1.2	2.6	97	Bright
			1.6	2.6	92	Edges rough
60	60	30	2.4	3.2	96	Dull
			3.2	4.0	93	Bright
			4.0	4.6	90	Bright
			4.8	5.0	88	Bright
60	60	60	1.6	2.2	94	Dull
			2.4	2.9	94	Brighter
			3.2	3.6	92	Brighter
			4.0	3.9	90	Brighter
			4.8	4.3	90	Brighter
			5.6	4.6	87	Burnt
60	60	120	1.6	2.2	92	Bright
			2.0	2.4	91	Brighter
			3.2	3.0	90	Brighter
			4.0	3.6	90	Edges burnt
			4.8	4.0	87	Burnt
90	90	90	1.6	1.9	90	Dull
			3.2	3.0	96	Bright
			4.0	3.6	100	Brighter
			7.2	4.4	86	Brighter
			8.0	4.9	94	Bright
			10.0	6.5	90	Burnt
90	90	180	1.6	1.6	95	Dull
			2.4	2.4	93	Brighter
			3.2	2.6	90	Brighter
			4.0	2.9	90	Brighter
			6.0	3.8	89	Bright
120	120	120	2.0	2.2	60	Dull
			3.2	2.8	83	Bright
			4.0	3.2	90	Bright
			5.6	4.0	91	Bright
			7.2	4.4	100	Bright
			8.0	4.8	100	Bright
			8.8	5.0	95	Bright
			10.0	5.3	92	Bright

TABLE III

*p*H: 9.15–9.50

Copper oxalate g/l	Amine ml/l	Rochelle salt g/l	Addition agents g/l	Sp. conductivity mhos/cm²	Cathode polarization range volts (C.D. 1.6–4.0 amp/dm²)	Throwing power at 3.2×10^{-3} amp/cm²
30	30	—	—	0.0090	—	—
60	60	—	—	0.0141	0.38–0.72	1.28
60	120	—	—	—	0.26–0.60	—
90	90	—	—	0.0183	0.20–0.36	1.17
60	60	30	—	0.0299	—	—
60	60	45	—	0.0347	(C. D. 1.6–4.8 amp/dm²)	
60	60	60	—	0.0398	0.71–0.82	2.01
60	60	75	—	0.0430	—	—
60	60	60	KNO_3 5	0.0394	0.26 –0.89	2.03
60	60	60	NH_4NO_3 5	0.0417	0.49–0.98	2.11
60	60	60	$NaNO_3$ 5	0.0392	0.39–0.83	1.95

some inorganic salts were added to the optimum concentration bath 60:60:60. Ammonium, potassium, and sodium nitrates (5 g./l.) increased the brightness of the deposits and raised the limiting C.D. from 4.8 to 6.0 amp./dm.² but considerably decreased the cathode efficiency to 58-80 per cent (2.4-6.0 amp./dm.²). Ammonia (5-40 ml./l.) eliminated the brittleness of the deposits but the bright C.D. range decreased and the anodes tended to blacken. Ammonium sulfate, chloride, and carbonate (5-15 g./l.) decreased the C.D. range. The deposits were unsatisfactory with ammonium carbonate. Sodium chloride (5-15 g./l.) decreased the C.D. range considerably and the anode corrosion was poor at higher C.D.

Conductivity, cathode polarization, and throwing power.—Table III gives the conductivity, cathode polarization (range), and throwing power of the bath, with and without additions. The polarization values give a general idea of the variations but should not be considered as very accurate in view of the difficulties in reproducibility. The throwing power of the bath was fairly good. Satisfactory deposits were obtained on the reverse side of the cathode when only one anode was used and the plating solution threw well into the recesses of irregularity shaped cathodes. The values given below were calculated according to the equation of Schlotter-Korpiun.[10]

An increase in the metal concentration increased the conductivity and decreased the polarization and throwing power. Excess of amine decreased the polarization. Rochelle salt increased the conductivity, cathode, polarization, and throwing power. Addition of nitrates had little effect on the conductivity but in some cases slightly increased the polarization and throwing power at higher C.D. The cathode polarization at which burning occurred was of the order of 0.9 volt.

The throwing power was less than that of the cyanide bath where it is of the order of 4. In the amine bath, it can be improved to a value of 3 under certain conditions. It was also calculated from the equation of Gardam[11] by substituting, as an approximation, the inter-electrode distance from l_2 in the equation. At a C.D. of 2.0×10^{-2} amp./cm.² (where the cathode polarization —log C.D. relationship was roughly linear) the throwing power for the ethanolamine bath with and without additions was in the range 7-30 per cent, as against the normal value of 30-40 per cent for the cyanide bath.

Comparison between ethanolamine and cyanide baths.—Table IV will give an idea of the relative performance of the rochelle salt-copper oxalate-monoethanolamine and rochelle salt-copper cyanide baths. The values for the cyanide bath were experimentally determined under the conditions recommended by Bakhvalov.[12]

The advantages of the amine bath over the cyanide are: (*a*) wider C.D. range; (*b*) higher cathode efficiency; (*c*) brighter deposits; (*d*) ability for good working at the room temperature; (*e*) satisfactory performance without the use of special additions; and (*f*) stability. On the other hand, the cyanide bath has a higher conductivity and cathode polarization, and superior throwing power.

The rate of deposition of copper from the rochelle salt-amine bath was compared with that from the "low concentration" cyanide bath[13] and "high efficiency" cyanide bath without brightener,[14] at a C.D. of 2.4 amp./dm.² It was in between the rates for the cyanide baths.

Discussion

The electrodeposition of copper from the complex monoethanolamine bath yields smooth, fine-grained, and bright deposits on steel. There is no immersion deposition due to the low copper ion concentration. The high cathode efficiency, which is very near 100 per cent, is a definite advantage. Brockman and Tebeau[3] used the plating composition: copper sulfate, sodium oxalate, and monoethanolamine at cathode efficiencies from 93-111 per cent and concluded that, so far as the throwing power is concerned, the monoethanolamine bath is the least suitable of the ethanola-

TABLE IV

Composition	*Ethanolamine* Copper oxalate, 60 g/l Mono amine, 60 ml/l Rochelle salt, 60 g/l	*Cyanide* Copper cyanide, 40 g/l Sodium cyanide, 50 g/l Sodium carbonate, 30 g/l Rochelle salt, 60 g/l
*p*H	9.5	11.4
Temp, °C.	24.0	60.0
(Cu) g/l	24.0	28.4
(Copper ion) g ion/l	3.16×10^{-13} (Cu^{++})	2.29×10^{-20} (Cu^{+})
Sp. conductivity, mhos/cm²	0.0398	0.0987
Bright C. D. range amp/dm²	2.4–4.8	2.0–2.5
Cathode polarization, volts (0.8–5.6 amp/dm²)	0.24–0.82	0.65–1.11
Bath voltage volts	2.9–4.3	0.9–4.0
Cathode efficiency, %	90–94	70–76
Throwing power	Fairly good	Good
Quality of deposit	Brighter	Bright

mine baths (mono-, di-, and tri-) for copper plating. In the present work the throwing power of the monoethanolamine bath has been found to be fairly good and of the same order as that of the di- and triethanolamine baths.[15]

The inclusion of rochelle salt in the amine bath improves its performance to a great extent and the beneficial effects are on the lines observed in the rochelle salt-copper cyanide bath.[13] The action of this salt is probably due to its reducing nature and tendency to form further complexes. A decrease in the metal ion concentration on addition of rochelle salt is accompanied by the formation of brighter deposits. The addition of nitrates to the rochelle salt-amine bath increases the brightness and the C.D. range but reduces the cathode efficiency. This can be attributed to the inhibiting action of the nitrate ion.[16,17] It is preferentially reduced to ammonia before the hydrogen ion, preventing the formation of spongy deposits and enabling higher C.D. to be used. The effect of the addition of other ions is of a specific character. Small variations in pH are not of much significance.

Complex salt plating baths generally give fine-grained and bright deposits due to the low metal ion concentration. The cathode polarization and throwing power in such solutions is high. In the ethanolamine bath the copper ion concentration is low and fine-grained; bright deposits are obtained. The cathode polarization is high. But the conductivity is lower, the cathode efficiency higher, and the throwing power less than that of the cyanide bath. The polarization is increased by the addition of rochelle salt and by some nitrates (to a little extent) which act as brighteners. It is likely that cathode polarization has some significance in the electrodeposition of copper from the ethanolamine baths.

Summary

1. The copper oxalate-monoethanolamine-rochelle salt bath gives smooth, fine-grained, and bright electrodeposits of copper directly on steel. The optimum conditions are: copper oxalate 60 g./l., monoethanolamine 60 ml./l., rochelle salt 60 g./l., C.D. 2.4-4.8 amp./dm.^{2}, pH 9.5, and temp. 24°C.

2. The beneficial effects of rochelle salt are of the same nature as in the rochelle salt-copper cyanide bath.

3. The advantages of the amine bath over the cyanide are: (*a*) higher cathode efficiency, (*b*) brighter deposits, (*c*) comparative stability, (*d*) nonpoisonous nature.

4. The bath is not suitable for plating at higher temperatures. Its conductivity and throwing power are lower than that of the cyanide bath. The bright C.D. range is of the same order.

5. The addition of nitrates increases the brightness and the limiting C.D. but reduces the cathode efficiency for deposition.

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EXTRACTS
From the World's Plating Literature

Influence of Screens and Profiled Anodes on Throwing Power in Plating Baths

J. Steiner and K. Schery; *Metalloberflaeche*, vol. 6, No. 8, pp. B113-B116.

It is possible to obtain a nearly perfect metal distribution at the cathode, when using flat, plane anodes, by employing screening masks in various ways, often very simple ones. When hollow shaped parts are being plated, the metal distribution is very much worse than when plating on a flat shaped cathode and some correction to overcome this is all the more necessary; and all the more difficult to apply, the greater the internal depth is of the part. An investigation was made of the influence of screens and special shaped anodes on the metal distribution for the case of a hollow cone, the internal angle of slope being 60° thus representing fairly unfavorable conditions. The cone shaped cathode was so arranged that only the hollow side of the cone was accessible to the current. For purpose of measurement, the internal conical surface was divided into five insulated rings of equal surface area, whose total area amounted to 1 sq. dm. The average current density at the cathode was in all cases 1 amp./sq. dm. As anodes, for the tests with flat screens, there was always used a circular shaped anode of 1 sq. dm. surface which was always spaced at a distance of 15 cm. from the base of the cone and was, for test purposes, called the main anode. The auxiliary anodes, which were used in addition with the remaining tests, were of varying size and shape and were spaced at various distances from the cathode. They were used in several cases with the main anode but mostly without this.

These with flat screening masks on the metal distribution showed that their influence under the given

test relations is always very small. Thus the metal distribution factor = k, which amounted to 26 without the screen, when using screens of 5 cm. diameter and 3 cm. distance from the cathode, was only improved to 22 and at 1 cm. distance only to 17. With 2 cm. diameter screen and 3 cm. distance of the screen k = 23, and with only 1 cm. distance, 15. The use of a conductive screening mask which is electrically connected to the cathode similarly showed only a small improvement of the metal distribution. With the most favorable arrangement investigated a ring constructed of sheet brass whose internal diameter was the same size as the diameter of the base of the cone (8 cm.) and whose external diameter amounted to 10 cm. spaced at a distance of 1 cm. from the cathode. In this case also there was an improvement of the metal distribution factor only to 15. Screens of smaller diameter had a less favorable influence. The current loss with a conductive screen is always very great: it amounted, in the case given, to 80% of the applied current.

Tube shaped screens in which are located auxiliary anodes consist in the simplest case of a short cylindrical tube of insulating material which is sealed at one end and contains an auxiliary anode with an insulated conducting lead. The open end of the tube is inserted more or less deeply into the cone, by which means the metal distribution can be fairly strongly influenced. Such screens can be used either with the auxiliary anode alone or else in conjunction with the main anode. If the screen is used without the main anode then there always occurs a strong maximum of metal deposition at that part of the cathode which is located somewhat before the end of the tube. More favorable than cylindrical screens are those which have the shape of a truncated cone containing an auxiliary anode. If, in addition, such screens are provided with one or more circles of holes and are carefully balanced against a definite cathode shape, then an almost perfectly uniform metal distribution is obtained. With such an arrangement the almost ideal metal distribution is obtained. With such an arrangement the almost ideal metal distribution factor of k = 1.23 was obtained. Each of the two circles of holes in the screen in this case comprised 10 holes and the holes were of 3.5 and 2.5 mm. diameter respectively. A special advantage of this type of screen is that, in addition, displacement of the screen is an axial direction up to about 5 mm. causes no very appreciable deterioration of the metal distribution. The simultaneous use of the main anode is always a harmful influence in such cases.

The metal distribution can be influenced more simply than with screens and yet to a very considerable extent by specially shaped anodes profiled to the cathode. For example, instead of a flat anode, a 1 cm. thick rod was tried, which was insulated over its whole length in the electrolyte except for a 3 cm. long part which projected into the conical cathode. With this arrangement a very good metal distribution was obtained with k = 1.77. If, in addition, the main anode is placed in circuit, the metal distribution again becomes more unfavorable with k = 2.43. By increasing the effective length of the rod anode to 4 cm. with simultaneous use of the main anode a metal distribution factor of 1.49 is obtained.

Anodizing of Small Mass-Produced Parts of Aluminum

H. W. Dettner: *Metalloberflaeche*, vol. 6, No. 8, pp. B116-B118.

With the anodizing of small aluminum parts, because of the low cost involved with each part, individual handling is not possible and large scale mass processing is the only feasible solution. The obvious procedure would appear to be to process the parts in an analagous manner to the mass plating of small parts in drums or barrels. Practical experience has shown, however, that this is not suitable mainly because, as is known, the coating on the metal obtained by the anodic oxidation is not very conductive to the electric current if at all, apart from the difficulties of finding a material for the construction of the drums or barrels which is conductive to the electric current but which is not attacked and oxidized by the electrolytes. Another difficulty is connection with the anodizing of small mass-produced parts consists in the temperature relations of the bath because the temperature must remain constant within a relatively narrow range if fault-free anodized films are to be obtained. The current densities applied are relatively low so that the heating up the bath by the Joules effect is not very great; the reaction heat set free by the oxidation of the aluminum is more appreciable. In practice, accordingly, the temperature is maintained within the prescribed range by means of cooling. When anodizing small parts on a large scale however, this is not a simple matter, because of the large surface area of the parts. Finally, care must be taken to ensure the complete and rapid removal of the gas bubbles formed during the anodizing process as otherwise no anodizing occurs on the surface part covered by these gas bubbles. Here again, particular difficulty is met with in the mass anodizing of small parts, as the bubbles obstinately persist in the interior of the parts. One practical aspect which is in favor of mass treatment is that anodizing baths show a good throwing power; this is better with the sulfuric acid bath than with the oxalic acid electrolyte; in addition, the throwing power in baths which are operated with direct current is better than that in baths where the anodizing is effected with alternating current.

Many proposals have been outlined for this mass anodizing but few have survived the experimental stage to become commercial.

One construction which is used on a practical scale consists of a truncated conical basket. This basket requires no special bath container or barrel but can be fastened to the racking bar of any bath. The almost round basket consists either of pure aluminum or acid and alkali resistant plastic. The basket body is pierced with numerous 2-4 mm. wide holes for the entry of the electrolyte. The actual size of the holes is dependent on the shape of the small parts to be anodized; their number is arranged according to the required

flow velocity of the bath electrolye. With the baskets which are constructed of metal the current conduction can be effected through the basket wall itself; generally, however, there is arranged, in the midde of the basket, a tube which is perforated in a similar manner to the basket body and this serves during the electrolysis simultaneously as the anode current lead and for the introduction of compressed air or, better, fresh electrolyte. In this way, on the one hand the electrolyte is cooled and, on the other hand, the mechanical removal of the adherent gas bubbles is achieved. In addition, rinsing after pickling or anodizing can be accelerated by the introduction of hot or cold water through the tube. The filling and emptying of the basket can be conducted through a top opening. There are designs, however, in which the charging opening is located at the bottom so that the drum is revolved for charging and emptying. After the ware has been carefully degreased, pickled and polished, it is shaken several times so as to obtain as dense a packing of the filled articles as possible. The parts must have good contact with one another and with the anode. The closure cover, which is usually plastic, is fastened down on the filling opening. The shaking is repeated and the cover screwed down again.

The anodizing operation is conducted generally at 15-18 volts direct current in a sulfuric acid electrolyte of 21-24° Bé. A more dilute bath requires a higher voltage. The current density is arranged at 1.2 to 1.5 amps./sq. dm. If the fresh electrolyte passed into the bath can be cooled in a cooling system, then the bath can be operated at 2 amps./sq. dm. The temperature should not rise above 23°C. According to the purpose of application and requirements, the duration of the anodizing is 20 to 30 minutes and, for special purposes, for example in order to obtain a special color effect, up to 60 minutes.

Correct Plating Bath Operation

Galvano (Paris); vol. 21, No. 189, pp. 15-17.

In the case of an alkaline copper bath, a bad practice is to load the bath with excessive amounts of cyanide, with the object of obtaining a brighter deposit. This fault is more commonly encountered than one would realize in the small job plating shop, and even sometimes with the larger concern. The dark red deposit is normal to an alkaline cyanide copper bath and nothing is wrong if one does not obtain the rose colored deposit characteristic of the acid sulfate bath. Another bad practice is to work the alkaline copper bath at a lower current density and gas evolution is hardly visible around the cathodes. If analytical bath control is not available, the free cyanide can be estimated empirically by the stability of the indicating needles of the bath measuring instruments. If these remain fixed after an hour of working, the free cyanide is sufficient. Sodium cyanide is added only if the amperage decreases and the voltage rises, a direct consequence of the passivity of the anodes. It is bad practice to maintain the copper metal content of the bath with copper sulfate. It should be realized that copper plating conducted in a classical copper cyanide bath allows of only a low current density operation. Too high a current density will lead to striation and dark patches and granulation, even in a bath of correct composition. This, in turn, can lead to flaking and peeling of a subsequent nickel or chrome plate. If high current densities are required, then an alkaline copper bath of very high concentration must be employed; this bath however requires very close regulation and is hardly suitable for the small plating shop to operate without scientific and analytical control facilities.

If a copper plate from an acid bath is applied over a preliminary coating from an alkaline copper bath, then a very thorough rinsing in two different waters is necessary and pressure spray rinsing is advisable. Without this precaution, there is the danger of contaminating the acid bath with cyanide and, in addition, the adhesion of the acid copper may suffer. If the rinsing has not been satisfactory, a greenish deposit will be seen on the ware when immersed in the acid bath. If this happens, the ware should be immediately withdrawn and rinsed afresh; if the parts are of a recessed shape, the rinsing should be all the more thorough so as to insure that all residual liquid is removed from the recesses. Even greater care at the rinsing stage is necessary when processing tubes and parts made from tubing. The tubular parts should be allowed to fill with water several times and be emptied before processing with the acid copper plate.

The making-up or dosing of a brass plating bath requires certain consideration. Although the scientifically trained might think that this is an operation which could be conducted scientifically, it is emphasized that this is purely an empirical procedure. The operation should be conducted cautiously, while modifying the current density. If the tint of the deposit is very pale, the current should be reduced before adding a copper salt. If the deposit is very red, the current should be increased before adding either cyanide, or a zinc salt. These remarks hold good bath for brass plating from a still bath or barrel plating. Additions of cyanide should be made to a brass plating bath with considerable caution. Patience is also necessary when topping up the bath because a certain lapse of time is necessary for equilibrium to be attained before one or other of the addition products fully acts.

With cadmium plating, the brown or white spots which are often seen on the cadmium deposit after several days storage are rarely due to the bath composition. They can most often be attributed to bad preparation of the base metal, i.e. insufficient pickling or degreasing. The pickling must be conducted with care because the least trace of oxide will react after the cadmium plating even though the part will look satisfactory. The nature of the bath may partially compensate for imperfect degreasing together with high current densities but, even if good adhesion is obtained, which can be debatable, the bath will be contaminated with the grease.

Shop Problems

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Lacquer Adhesion to Stainless Steel

Question: We have stainless steel bolts of which the head of the bolts must be painted with lacquer. Do you know of a dip we could give these bolts to make the lacquer adhere?

F. H.

Answer: For adhesion of organic finishes to chromium plate, immersion in a 2% solution of chromic acid at about 150-160°F., for periods up to 4 minutes has been suggested. No subsequent rinse is necessary.

This process may be suitable for stainless steel also. However, if it is not, we would suggest that you communicate with the supplier of the lacquer you are using.

Recovery of Gold from Contaminated Bath

Question: We have approximately 100 gallons of gold solution which are contaminated with iron and copper. It contains approximately ½ oz. gold per gallon of solution. Please advise if there is a practical method of reclaiming this material.

J. C. B.

Answer: The gold can either be plated out on a thin sheet of copper or brass, or it can be precipitated from the solution with zinc dust. The latter is added in two doses of ½ oz./gal. each to the warm or hot solution and stirred well.

After settling, the mud is washed free from cyanide and sent to a refiner or treated with a mixture of equal parts of nitric acid and water. The excess zinc will be dissolved as will most of the usual contaminating metals, leaving a fairly pure gold mud, which can be dissolved up again or melted and cast into an anode.

Quicking Dip Prior to Silver Plating

Question: We shall be glad to have your advice on the use of quicking solution in silver plating spoons and forks. There is a definite understanding here in England that if the quicking process is omitted the plate tends to strip and we should like to know if you are aware of any difference between American and English technique which will militate against the possibility of stripping. Is it just prejudice or conservatism here which makes the platers in the spoon and fork trade practically universally retain their quicking vats?

D. B.

Answer: In this country the use of a quicking dip prior to silver plating is considered out-of-date. Standard practice is to employ a silver strike, after cleaning and acid dipping. There should be no trouble with peeling. From this side of the ocean we would consider British practice as conservative, not prejudiced.

Plating and Etching Stainless Steel

Question: I would like to know if stainless steel can be gold plated and also what acid is used for etching stainless steel.

F. F.

Answer: Although Lukens patented a gold solution for plating stainless steel pen nibs in 1938, the simplest method is to strike the article, after cleaning and acid dipping as usual, in the acid nickel chloride bath, the procedure for which will be found in the METAL FINISHING Guidebook.

Stainless steel may be etched with mixtures of muriatic acid and ferric chloride. A common formulation contains equal parts by volume of muriatic acid and 40 degree ferric chloride solution, which is obtainable from photoengravers' supply houses, if your plating supply house does not carry it.

Books on Metal Coloring

Question: On page 450 of the 1951 Guidebook-Directory we note that you mention a book by Hiorns called "Metal Coloring and Bronzing." Since we do quite a bit of finishing in the antique manner on French Provincial, Empire and other traditional finishes, we should appreciate your advice as to whether this book would be applicable, or whether you know of some other handbook that would be more efficient as a guide and reference for our work. We do this oxidizing on both brass castings and brass plated die castings.

A. S. R.

Answer: "Metal Coloring and Bronzing" by Hiorns is out of print, but you may be able to examine a copy at the New York Public Library. "Metal Coloring and Finishing" by H. Krause will probably contain the same information and is a much more recent volume.

Molybdenum Plating

Question: We are greatly interested in molybdenum plating and would appreciate, if available, any data or technical information pertaining to this subject.

M. A. B.

Answer: A number of plating baths including acetate, citrate, formate, fluoride, phosphate, propionate and sulfate solutions have been suggested in the literature. One of the most comprehensive reports on this subject was presented by Ksycki and Yntema and published in the Journal of the Electrochemical Society (Vol. 96, pp. 48-56 [July 1949]). We would suggest that you write to the Society at 216 West 102nd Street, New York 25, N. Y. to inquire whether reprints are available.

Glass Tanks & Brass Plating

Question: Up until a few months

ago I had been able to purchase one piece glass molded tanks made of flint glass with polished runs. The dimensions of this particular glass tank were 11½" long x 8" wide x 8" deep.

Our laboratory supply firm is now unable to furnish these tanks. I have written to a number of glass manufacturers who were of no help. Can you suggest a source for such an item? A glass tank or a substitute should have the following advantages:

1. Plated parts can be seen during plating.
2. The tank shall be a one piece molded part.
3. The tank shall be inert to all plating and anodizing solutions.

Secondly, do you know of a good method of plating brass on steel hardware? I wish to obtain a high quality good wearing job on items such as door knobs, screws, door plates, etc.

A. A. F.

Answer: We do not know of any special source of glass tanks such as you mention. It is presumed that you have checked with Corning Glass. They used to make a full line of battery jars.

Have you considered Lucite tanks? These will stand the plating and anodizing solutions. The high-temperature grade can be used up to about 200 deg. F. Lucite tanks are made by cementing sheets. For molded tanks you might consider the Fiberglas laminate tanks, which are obtainable from most plating supply houses. However, they are translucent rather than transparent.

The brass plating procedures in the *Metal Finishing Guidebook* are standard for plating on steel hardware. The amount of brass deposited will determine the quality to some extent, but industry usually depends on a good coat of lacquer.

Hard Chromium on Case Hardened Steel

Question: We would appreciate receiving any information you may have pertaining to the chrome plating of case-hardened steel. At present, we are treating flat case-hardened steel plates by the following standard procedure: anodic clean; muriatic dip; anodic chrome; strike at 5 to 6 amps per square inch for 5 minutes, then lower the current to 2 amps per square inch for enough time to deposit .004" thickness. We are not getting good adhesion, and many of our parts are blistering.

A. J. H.

Answer: The preparation cycle appears to be satisfactory. However, we believe that a strike at 5 to 6 amps./sq. in. for 5 minutes is excessive as you might be getting too much hydrogen adsorption. Has plating continuously at 2 amps./sq. in. without the strike been tried?

Another point to be checked is the anodic chrome etch. You do not state whether you are using the chromium plating solution or a separate tank. The preferable procedure is to use a separate tank with about 2 lbs./gal. chromic acid but no sulfate. The temperature should be about the same as the plating solution.

Statuary Bronze on Brass

Question: We would like some information concerning oxidized finishes, and are enclosing two samples herewith. The oxidized piece has been copper plated and oxidized in sulfide, followed by brushing on a dry brass brush. Our problem is to eliminate the copper plating and produce the same finish on 85-15 rich low brass. Please send us your recommendations as to the chemicals and concentrations for the desired finish; also suppliers of this material.

G. K.

Answer: The finish on the sample forwarded is a standard "Statuary Bronze." We know of no formula for producing this finish directly on rich low brass, without copper plating.

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Recently Granted Patents
in the Metal Finishing Field

Patents

Plating Barrel

U. S. Patent 2,642,392. *June* 16, 1953. *C. J. Sommers, assignor to Sommers Bros. Mfg. Co.*

In an electroplating device, a tank for an electrolytic solution, a drum for articles to be electroplated, an integral U-shaped frame mounted transversely of the tank, the outer ends of the arms of said U-shaped frame having axially aligned horizontal pintles, said drum having its ends rotatably mounted on said pintles, a pintle carried by one of said frame arms intermediate its ends, said last-named pintle being rotatably mounted in a bearing carried by one side of the tank, means cooperating with said last named pintle for pivotally rocking said frame, a drive shaft journalled on the tank opposite the last named pintle in axial alignment therewith, the other arm of said frame being rockably mounted intermediate its ends on the drive shaft in a bearing opening passing through said last named arm, whereby said drum is arcuately movable downwardly into the tank and upwardly out of of the tank, and a gear carried by the drive shaft to the inner side of the last named arm, said gear meshing with a gear carried by the adjacent end of the drum.

Plated Porous Objects

U. S. Patent 2,642,654. *June* 23, 1953. *G. W. Ahrens, assignor to Econometal Corp.*

In the art of powder metallurgy, the process of manufacturing articles of selected size and shape containing divided material of high fusion point, tensile strength and hardness, by internal bulk electroplating, which comprises mixing the divided material with metallic powder particles of high melting point and tensile strength different than the divided material until a substantially uniform mixture is obtained, with the metallic powder particles in electrically conducting contact with one another and with interestices being formed between the particles, forming the article to selected size and shape, filling the interestices with a plating electrolyte for depositing a metal of high melting point and tensile strength which is capable of forming an integrated bond with the metallic powder, and plating for a period of time sufficient to deposit the electrolytic metal from the plating solution upon the powder to unite the particles thereof and to form a rigid porous structure with interestices of reduced cross section.

Bias Sisal Buff

U. S. Patent 2,642,706. *June* 23, 1953. *J. R. Davies.*

A buff section comprising a flat annulus of woven material whose woof and warp threads are substantially the same in number at the inner periphery as at the outer periphery of the annulus and whose mesh are reshaped and increasingly smaller toward the inner periphery so that the woven material lies substantially flat without pleats, and means for holding the woof and warp threads in said reshaped position.

Vapor Phase Inhibitors

U. S. Patent 2,643,176-8 *June* 23, 1953. *A. Wachter and N. Stillman, assignors to Shell Development Co.*

A material capable of inhibiting corrosion of a metal by an atmosphere containing oxygen and water vapor, which comprises a substantially solid fibrous material containing a corrosion-inhibiting amount of an organic nitrogen-base nitrite salt having a vapor pressure of at least about 0.00002 mm. Hg at 21°C.

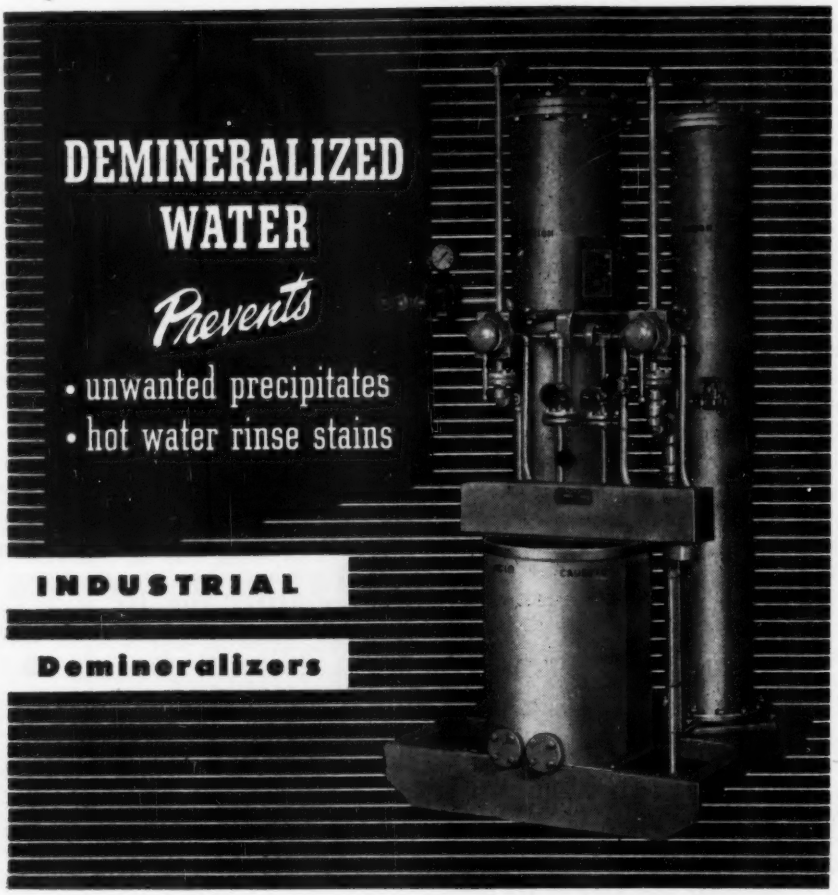
The combination comprising a metal article normally corrodible by contact with water vapor and oxygen, and a substantially solid covering material enclosing said metal article, said covering material containing an organic ammonium nitrite salt having a vapor pressure of at least about 0.0001 mm. Hg at 21°C., said nitrite salt being present in an amount sufficient to maintain a corrosion-inhibiting atmosphere which, upon dispersion in water, yields a solution having a pH value of at least about 6.

In a method for inhibiting corrosion of a metal normally corrodible by contact with water vapor and oxygen, the step of forming, in the immediate vicinity of said metal and subjecting said metal to, an atmosphere containing a corrosion-inhibiting concentration of an organic ammonium nitrite salt having a vapor pressure of at least 0.00002 mm. Hg. at 21°C., said atmosphere, upon dispersion in water, yielding a solution having a pH value of at least 6.

Vacuum Metallizing

U. S. Patent 2,643,201. *June* 23, 1953. *E. E. Chadsey, Jr., Philip J. Clough and P. Codley 2nd, assignors to National Research Corp.*

In a process for the coating of a substrate with aluminum by the vapor deposition of aluminum in a vacuum chamber wherein the aluminum is evaporated from a carbonaceous crucible which is formed of elemental carbon selected from the group consisting of amorphous carbon, graphite and mixtures thereof, the improvement which comprises heating the crucible and the molten aluminum therein to a temperature above about 1200°C. so that the vapor pressure of the aluminum is above the free air pressure in the vacuum chamber while supplying induced heating current to the crucible and the aluminum therein, maintaining said induced heating current at a frequency between about 9600 and 150,000 cycles per second, said frequency and the crucible wall thickness being so related that the skin depth of the induced current is substantially greater than the thickness of the crucible wall to cause a substantial stirring of said molten aluminum, thereby carrying into the body of the melt aluminum carbide crystals floating on the surface of the melt and thus maintaining the surface of the aluminum melt free of substantially all aluminum carbide scum, and depositing on said substrate aluminum vapors emanating from the surface of the molten aluminum.



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Pickling Waste Treatment

U. S. Patent 2,643,204. *June* 23, 1953. *E. B. Mancke, assignor to Bethlehem Steel Co.*

In a process for treating a used nitric acid pickling solution containing ferric nitrate and a substantial amount of free nitric acid, the step of autoclaving the solution at a temperature of not less than 340°F., to produce an insoluble ferric compound and to form and retain free nitric acid in said solution.

Electrodeposition of Phosphorus-Nickel and Phosphorus-Cobalt Alloys

U. S. Patent 2,643,221. *June* 23, 1953. *A. Brenner, D. E. Couch and E. K. Williams, assignors to the United States of America.*

The method of electrodepositing alloys of phosphorus with a metal of the group consisting of nickel and cobalt which comprises electrolyzing a solution containing said metal in the form of a salt chosen from the group consisting of sulphates and chlorides in the presence of phosphoric acid and phosphorous acid and having a pH of about 0.5 to 2.0.

Electroplating Rack

U. S. Patent 2,643,225. *June* 23, 1953. *H. F. Jones and H. R. Colby, assignors to Federal Mogul Corp.*

In a rack for electroplating hollow articles, a frame comprising an upper end element having a pair of spaced downwardly depending legs which are provided with inwardly projecting flanges at their lower end portions, an upper and a lower end member positionable between said legs, a first pair of angle bars carried by one of said end members and extending toward the other of said end members, and a pair of abutments carried by said other end member and clampingly engaging the extending end portions of said bars, said end members having a first dimension in a plane extending transversely of said legs and of a magnitude less than the distance between said flanges whereby said end members may be inserted longitudinally of the legs between said flanges into the space between said legs, said lower end member having a second dimension in said plane of a magnitude greater than the distance between said flanges but less than the distance be-

ween said legs, said second dimension being aligned with said flanges whereby said lower end member seats on and is supported by said flanges.

Electrical Contactor Roll for Electroplating Machines

U. S. Patent 2,643,303. *June* 23, 1953. *A. C. Frankwich, assignor to Western Electric Co., Inc.*

An electrical contactor for electroplating machines comprising an internally threaded fixed shaft, an elongated roller rotatably mounted upon the fixed shaft, and an externally threaded member threaded into the internally threaded shaft and engaging the roller effective, upon rotation thereof, to shift the roller along its longitudinal axis while still mounted upon the fixed shaft, whereby different portions of the peripheral surface of the roller may be engaged by elongated electrical conducting members passing thereover.

Cleaning Cupreous Articles

U. S. Patent 2,643,961. *June* 30, 1953. *C. J. Snyder and W. G. MacLelland, assignors to Anaconda Wire and Cable Co.*

In a process for removing scale from a cupreous article involving heating the article in a halogen-bearing atmosphere and subsequently cooling the article, whereby the scale separates readily therefrom, the improvement which comprises introducing the halogen into the atmosphere in which the cupreous article is heated by heating a substance of the class consisting of chlorinated, brominated and iodinated organic compounds to above its decomposition temperature and introducing the gaseous decomposition products thereof into said atmosphere.

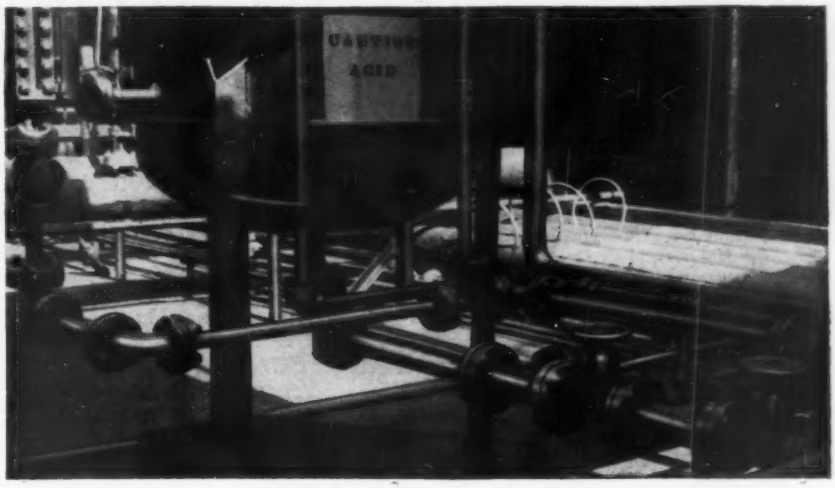
Process for the Protective Treatment of Iron

U. S. Patent 2,643,959. *June* 30, 1953. *J. Fischer, assignor to Manufacturers Chemical Corp.*

A process for the protective treatment of iron, comprising causing iron to react at 700° to 1000°C. with an anhydrous gaseous medium consisting of hydrogen and aluminum chloride and obtained by the reaction, at 300° to 600°C., of anhydrous HCl gas and a mixture of aluminum, aluminum oxide, and coal, until a coating of alu-

CORROSIVE FERRIC CHLORIDE FLOWS THROUGH THIS SARAN LINED INSTALLATION

Large West Coast refinery depends on easy-to-install SARAN LINED STEEL PIPE to resist corrosion and assure uninterrupted processing



Some time ago, a large West Coast oil company investigated better methods to handle corrosive ferric chloride solution. The company's successful operation demands uninterrupted processing. Unscheduled "shut-downs" mean production pile-ups, lay-offs and heavy expense. Saran Lined Steel Pipe was successful from the start. The use of Saran Lined Pipe Fittings and Valves assured tight, leak-proof joints. The dependable, long-term service and excellent corrosion resistance of strong, rigid Saran Lined Pipe will postpone replacements indefinitely. Saran Lined Steel Pipe can be delivered immediately, cut and threaded to your specifications or fabricated in the field with your own equipment. We'll be glad to assist you with installation plans. Write or call the SARAN LINED PIPE COMPANY, Ferndale, Michigan. Offices in New York • Boston • Pittsburgh • Tulsa Philadelphia • Chicago • Portland Indianapolis • San Francisco • Houston Denver • Los Angeles • Seattle Cleveland • Charleston, S. C. Toronto • Montreal.

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SARAN LINED PIPE COMPANY

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Here's a unique type of batch cleaning machine for all kinds of metal parts that enables you to fit the cleaning operation right into your production line. The cleaning job is so speeded up by the "up and down" motion of the work in the machine that in most cases the flow of parts through the machine is practically continuous from a production line viewpoint.

No Motors...No Gears...No Sprays

This Magnus Aja-Lif Cleaning Machine has NO motors...NO gears...NO sprays. It is powered by compressed air. Its compactness makes it easy to fit into limited floor space, and as there are no overhead conveyors or hoists, there is no head-room difficulty.

The Magnus Aja-Lif Cleaning Machine is fast and uniquely thorough in its cleaning action because the work itself moves up and down in the cleaning solution many times a minute, providing a mechanical "shearing" action on the dirt and chips, plus constantly agitated cleaning solution that works faster and better because of it.

Minimum Labor Costs

The Aja-Lif Machine loads and unloads at the top, at waist level. One lever lowers the load, starts the machine, cuts it off and raises the load at the end of the brief cleaning period. It's a one man job, with no supervision required during cleaning.

magnus

MAGNUS CHEMICAL CO., INC.
11 South Ave., Garwood, N. J.
In Canada: Magnus Chemicals, Ltd., Montreal
Service Representatives in Principal Cities

minum is deposited on the surface of the iron treated.

Method of Lead Coating a Ferrous Article

U. S. Patent 2,643,975. *June* 30, 1953. *R. A. Neisch, assignor to U. S. Steel Corp.*

The method of applying an adherent coating of substantially pure lead to a ferrous metal article which consists of electroplating the article with a tin coating between 0.000003 and 0.0000-18 inch in thickness, heating the tin plated article to a temperature between the melting point of tin and 650°F. to substantially completely alloy said tin with the surface of said article, and then immersing the heated article in a molten bath of lead.

Corrosion Prevention

U. S. Patent 2,644,774. *July* 7, 1953. *J. E. Baxter, assignor to Parker Rust Proof Co.*

A composition for forming a sulfide coating on a steel surface which consists essentially of a member of the group consisting of the sulfide ion and ions which form the sulfide ion through reduction on the steel surface and in a proportion equivalent to about .3 to 1.3% sulfite ion, the thiocyanate ion in a proportion of from .05% up to and including saturation, and an acid selected from the group consisting of sulfuric, hydrochloric and nitric in a proportion sufficient to provide a pH in the range of about .3 to 1.1.

Porcelain Enamel

U. S. Patent 2,644,767. *July* 7, 1953. *R. F. Duncan, assignor to Ferro Corp.*

The process of making a ceramic pigment which comprises intimately mixing black cobalt oxide from 20-40 parts by weight, aluminum oxide from 40-70 parts by weight, zinc oxide 1-5 parts by weight, silica 1-5 parts by weight and molybdenum trioxide 0.5-10 parts by weight, calcining the mixture in a furnace at a temperature of 2000-2350°F., for about 5-6 hours, wet milling the resultant cooled calcined mass, drying and then pulverizing in a suitable pulverizer.

Nickel and Cobalt Deposits

U. S. Patent 2,644,787. *July* 7, 1953. *T.-H. Bonn and D. C. Wendell, Jr., assignors to Eckert-Mauchly Computer Corp*

The method for the deposition of a magnetic coating on an electrically conductive carrier comprising subjecting said carrier as cathode to at least partial electrolytic action in an aqueous bath having a pH in the range of 2 to 6 and including as essential constituents nickel ions in a concentration in the range 0.2 to 1.7N, cobalt ions in a concentration in the range 0.2 to 1.0N, and hypophosphite ions in a concentration in the range 0.04 to 0.2N, said electrolytic action being in the presence of the reducing action of the hypophosphite ions on the cobalt and nickel ions.

Bright Nickel Bath

U. S. Patent 2,644,789. *July* 7, 1953. *W. J. Shenk, Jr., assignor to The Harshaw Chemical Co.*

A method of electrodepositing nickel in the form of a deposit which is bright as taken from the plating solution without further treatment and which comprises electrolyzing an aqueous, acid solution of a nickel electrolyte of the class consisting of nickel sulfate, nickel chloride, and mixtures of nickel sulfate with nickel chloride, said solution also containing cooperating addition agents capable of imparting brightness to the deposit, one of said addition agents being a compound comprising two hetercyclic radicals, each containing a nitrogen atom in a 6-membered ring, and said radicals being connected to each other through said nitrogen atoms by means of a carbon-containing group, said

group being selected from groups of the class consisting of carbon chains having from 1 to 12 carbon atoms and chains made up of carbon and oxygen and containing not more than a total of 12 connecting atoms between said nitrogen atoms, and the other of said addition agents being an aromatic compound containing the

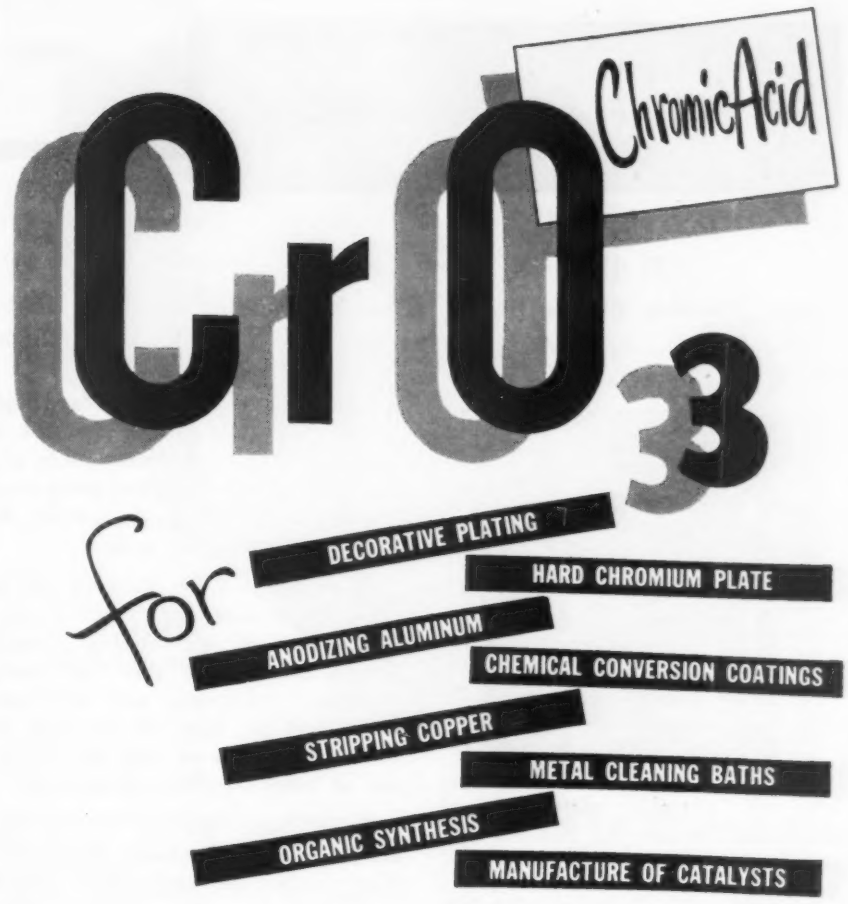
group, and being soluble in said solution to the extent of at least 0.2 gram per liter, the carbon atom in said

group being nuclear carbon, said first mentioned addition agent being present in concentration from 0.005 to 0.01 gram per liter, and said second mentioned addition agent being present in concentration from 0.2 to 15 grams per liter.

Regenerating Electropolishing Baths

U. S. Patent 2,645,635. *July* 14, 1953. *H. F. Walton, assignor to Schwayder Bros., Inc.*

A method of regenerating an electrolytic polishing solution initially comprising from 35% to 70% of orthophosphoric acid, from 8% to 64% of at least one water-soluble polyhydric alcohol, from 1% to 12% of a mono-hydroxy mono-carboxylic acid, from 5% to 30% of water, and from 0 to 10% of an addition agent adapted to increase the brightness of an article polished in said solution, said solution having been utilized in electrolytic polishing, and, as a result, having dissolved therein at least one metal selected from the group consisting of copper, zinc, nickel, and cobalt, which method comprises adding to said solution a reagent selected from the group which consists of oxalic acid, calcium oxalate, barium oxalate, methyl oxalate, ethyl oxalate, glycol oxlate and glyceryl oxlate, said reagent being added in an amount sufficient to precipitate at least a portion of the dissolved copper, zinc, nickel and cobalt and less than the amount which will result in free oxalic acid being present in the solution when utilized again.



● The Mutual name and trade mark on a Chromic Acid drum guarantee a product with a minimum assay of 99.75% and a sulfate content not exceeding 0.1%. Chromic Acid of that purity may be used with confidence in any of the above applications.

MUTUAL CHEMICAL CO. OF AMERICA

SINCE 1845 270 Madison Avenue New York 16, N. Y.

Plants: Baltimore - Jersey City

Buff Section

U. S. Patent 2,645,888. *July* 21, 1953. *F. H. Thompson, assignor to The Yerges Mfg. Co.*

A method of manufacturing a buffing wheel from a plurality of single ply fabric disk sheets, comprising: separately pushing the center of each sheet through a tubular element to form each sheet into an irregularly fluted conical member of fabric with the apex at the center of each sheet, radially arranging said conical members in a common plane in a circle with their apices adjacent each other to form a circular disk of said members, placing said disk of members between a pair of flat adhesive coated disks to maintain the radial location and relative position of said members in said plane, and then stitching said flat disks to each of said members whereby the center of said flat disks adjacent the apices of said members forms the axis of said buffing wheel.

Bright Zinc Bath

U. S. Patent 2,646,397. *July* 21, 1953. *R. J. Wean, assignor to The Wean Engineering Co., Inc.*

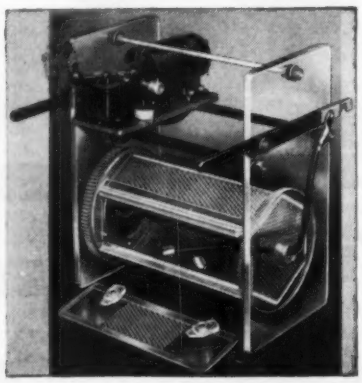
A method of electroplating a lustrous ductile coating of zinc on basis metal comprising passing an electroplating current from an anode to the basis metal as a cathode through an acid zinc electrolyte containing between about .005 and about .2 ounce of titanium per gallon of electrolyte.

Recent Developments

New Methods, Materials and Equipment for the Metal Finishing Industries

Lucite Portable Plating Barrel

Belke Mfg. Co., Dept. MF, 947 N. Cicero Ave., Chicago 51, Ill.



A new portable plating barrel streamlined for easy use and low cost production has been announced.

Weighing only 28 pounds, the new Model SPX Porto-Plater is easily set in the plating tank by hand. "V" shaped cathode contact notch fits cathode rod at any point on the rod.

Complete Lucite end plates reduce cost, support plater, protect cylinder and mechanism in handling. Reversing switch with geared head motor drive turns cylinder in either direction and holds positively for loading and unloading.

Obstruction-free cylinder of high temperature Lucite. Lucite cover with attached cover locks. Lucite hangers, gears, bushings, etc Ball contact with one-piece dangler cable.

Cylinder, OD 9 x 15", ID 6 x 12". Plating capacity, ¼ peck. With 115 V., 60 C., 1 Ph geared head motor drive, $167.50. Literature mailed promptly on request to manufacturer.

Pressure-Sensitive Tape

Minnesota Mining and Manufacturing Co., Dept. MF, 900 Fauquier St., St. Paul 6, Minn.

A new pressure-sensitive tape for the metal finishing industry, for high heat masking use by aircraft and electronic manufacturers on such treated metals as anodized aluminum, pickled steel, and dichromated magnesium, has been announced.

The new tape, "Scotch" brand high temperature masking tape No. 214, is expected to find widespread use by aircraft assembly, engine, and parts manufacturers, as well as throughout the entire metal finishing trade.

It is designed for masking use in oven temperatures up to 325°F., and is capable of withstanding "much longer bake cycles then previously possible." Laboratory and field tests show that the tape can be used in oven cycles even as high as 375°F., and at room temperatures as well.

In addition, tape No. 214 has the ability to remove cleanly from anodized aluminum and other treated metal surfaces without leaving adhesive deposit.

It is being distributed through aviation, mill supply, paper, and industrial supply jobbers nationally in ¼- to 36-inch widths on 60-yard rolls. The tape is also being die-cut by paper converters according to customer specification.

Chemical Pumps

Eco Engineering Co., Dept. MF, Newark, N J.

The above manufacturer announces the addition of another outstanding material of impeller construction for their All-chem pumps — du Pont "Hypalon."

This chlorinated polyethelene polymer is particularly advantageous for the service since it is dimensionally stable up to 160°F. and permits pump operating pressures to 150 p.s.i.

Chemically, these impellers are ideal for such chemicals as chromic acid, nitric acid, sodium hypochlorite, stannous chloride, sulphuric acid and pickling and electroplating solutions.

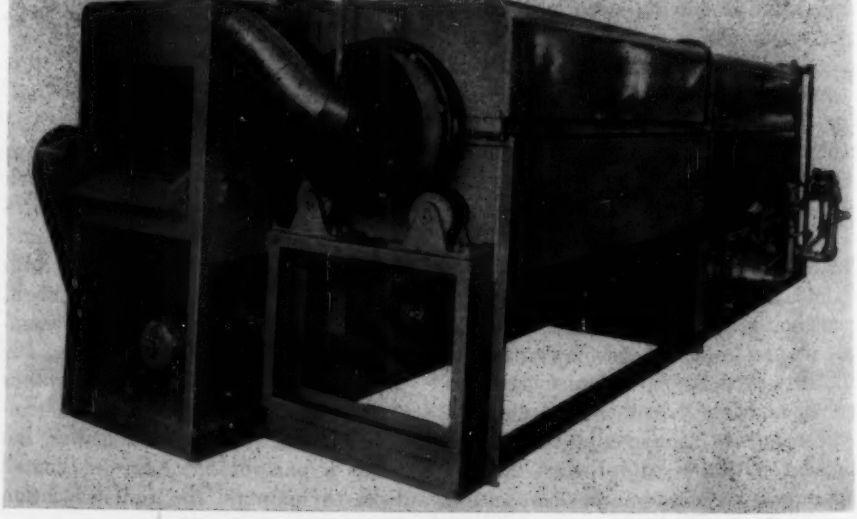
The material has zero moisture absorption, high immunity to attack by ozone, good flex life, and resistance to oxidation and abrasion.

Hypalon impellers are the newest addition to Eco's long list of impeller materials for pumping practically any neutral or chemically active fluid. These materials include Teflon, phenolic plastics, synthetic rubber, powdered metals, Monel and other nickel alloys, etc.

Combination Washing Machine

Metalwash Machinery Corp., Dept. MF, 901 North Ave., Elizabeth 4, N. J.

The above manufacturer announces a new combination rotary drum and

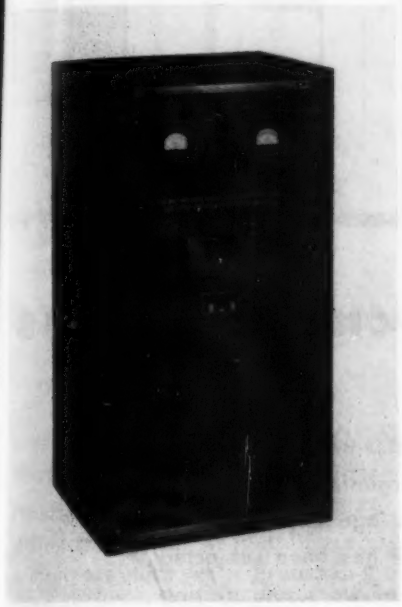


flat belt washing machine. Designed to remove drawing compounds, cutting oils, grease, and shop dirt from metal parts, this combination machine has both a rotary drum and a flat belt conveyor.

Small parts that can be tumbled are washed, rinsed, and dried in the drum, while the tote boxes and larger parts are processed on the conveyor.

500 Ampere Plating Rectifier

Perkin Engineering Corp., Dept. MF, 345 Kansas St., El Segundo, Cal.



The above manufacturer recently announced the first of its new line of plating rectifiers which is a 0-6 volt unit rated at 500 amperes continuously.

This rectifier is identified as Model No. P6-500T and has the features of 30-step voltage control and self-contained magnetic starter. Its dimensions are 18" x 22" x 42" and it is provided with an easily readable ammeter and voltmeter. It is claimed that the new rectifier has many advantages over the old type motor-generator sets in draft: outside of the cooling fan, there are no other moving parts. Also, the overall efficiency of the unit is higher.

These rectifiers are also available in voltage ratings up to 48 volts and current ratings up to 6000 amperes. Remote control units are also available.

New Automatic Plating Machine

Wagner Bros., Inc., Dept. MF, 400 Midland Ave., Detroit 3, Mich.

The company's new fully automatic electroplating machine introduces a

CIRCO
MONORAIL DEGREASER

CIRCO DEGREASERS
Use 30% Less Solvent
CUT LABOR COST 10 TO 50%

Can you afford the high cost of outmoded metal cleaning equipment? The new, modern Circo vapor degreasers—whether large or small—are engineered to save you 30% in solvent consumption and up to 50% in labor costs through more efficient design and operation. Circo, drawing on a background of 30 years experience in vapor degreasing, builds into its equipment such solvent-saving features as balanced condensing coils, leak-proof pumps, dual vapor-level control and regulated heat input. Circo degreasers are built to perform faster, save precious man-hours, through such construction features as easy access and clearance on two sides, large clean out doors, and well-placed controls and switches.

And ONLY Circo-engineered designs can provide these additional advantages:

1. Immediate interchangeable operation, Trichlorethylene or Perchlorethylene
2. 208 standard designs to choose from
3. Automatic reclaiming of solvent
4. Lowered maintenance costs — ease of cleaning and servicing
5. Complete technical field service — custom-engineered installations

Profit from Circo's firm policy of constant research and study that adapts the latest and best in metal cleaning to YOUR requirements.

And now — Circo Pioneers In Ultrasonic Cleaning

Circo again leads the way with the most modern and talked about metal cleaning development of the century. The new Circosonic Degreaser, equipped with General Electric ultrasonic generator, cleans metal parts by the power of sound—faster than ever thought possible and to a degree of cleanliness that passes the most stringent industrial standards. The Circosonic degreaser may fit your operating needs.

Write for full technical literature.

CIRCO HAS DEVELOPED A COMPREHENSIVE, AUTHORITATIVE MANUAL ON THE SUBJECT OF VAPOR DEGREASING. WRITE TODAY, FOR THIS 32-PAGE BOOKLET. NO OBLIGATION, OF COURSE.

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Vapor Degreasers • Metal Parts Washers • Dryers • Solvent Recovery Stills

Announcing

NICKEL-

A NEW BRIGHT NICKEL PROCESS

H-VW-M takes great pleasure in presenting Nickel-Lume, a superior new bright-nickel electroplating process. Nickel-Lume addition agents are of the organic type, yet have none of the inherent faults and limitations of previous organic agents. A result of several years of careful research and development, Nickel-Lume has been subjected to stringent field tests both in job shops, with a wide variety of work and plating problems, as well as in large plant production using full-automatic equipment. In every test, Nickel-Lume has shown excellent results, a *really bright finish directly from the plating bath* with all these marked advantages:

OUTSTANDING BRIGHTNESS—full, bright deposits over a wide range of operating conditions. Relatively thin deposits, too, are *really bright;* lustre builds as thickness increases. Even intricate, deeply-recessed articles have uniform brightness without shading.

LOW INTERNAL STRESS—stress can be controlled to a low value on either the compressive or tensile side and *held* within satisfactory limits as the solution ages—no cracking, crazing, lifting, or brittleness of deposits.

HIGH DUCTILITY—comparative nickel tests show surprising ductility—even after continued bath use in production.

GOOD LEVELING—in normal deposits surface roughness is reduced 50% more. Costly polishing and buffing can be substantially reduced.

WIDE CURRENT DENSITY RANGE—without noticeable change in brightness, current density can vary from below 5 to above 70 asf. Plating speeds can change to meet various production schedules and specifications.

WIDE SOLUTION TEMPERATURE RANGE—baths may be operated at room temperature with full deposit brightness up to and beyond 140°F. With moderate to high current densities, a temperature above 120°F. is seldom required.

GOOD STABILITY—no breakdown of addition agent,

PLATEMANSHIP

PLATEMANSHIP

PLATING & POLISHING PROCESSES · EQUIPMENT · SUPPLIES

Your H-VW-M combination—of the most modern testing and developing laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

3358

INDUSTRY'S WORKSHOP FOR THE

LUME

BY HANSON-VAN WINKLE-MUNNING COMPANY

therefore no cloudy, brittle, or highly-stressed deposits. No time-consuming, costly "stripping" operations.

HIGH TOLERANCE TO IMPURITIES—no bath "upset" by a few milligrams of metallic or organic impurities. As a rule, organics are tolerated in greater concentrations than in other bright baths.

SUPERIOR THROWING POWER—equal to or better than other commercial processes. Deposits-even in recessed areas—have uniform brightness without shading.

GOOD CORROSION PROTECTION QUALITIES—addition agent nature plus constant deposit characteristics give a high level of protection to the plated surface.

SIMPLE CONTROL—all constituents, including addition agents, can be determined and controlled by chemical analysis, thus maintaining deposits at constant and optimum characteristics.

PLEASING WHITE COLOR—approaching well-known cobalt-nickel deposits in whiteness of color—not the unappealing, yellow cast usually associated with organic addition agents.

NO OBJECTIONABLE FUMES—*ventilation is not required*—bath temperature is low, and no obnoxious or dangerous fumes are given off.

HIGH DEPOSIT ACTIVITY—deposit surfaces are exceedingly active and accept chromium or other deposits without activating treatment. In some installations, work with defective surfaces goes right back through normal plating cycle without blistering of nickel-on-nickel.

LOW INSTALLATION COSTS—all that is needed is equipment for a Watts nickel bath. Filtration can be periodic or continuous. No ventilation is required. Heat demands are low. Existing auxiliary equipment can be used.

LOW OPERATING COSTS—initial cost comparable to other bright nickel baths *but*, cost of brightener replenishment is much lower. Control is simple. No frequent pumping out and bath treatment. No production loss through sudden failure of bath to perform satisfactorily. Regular non-premium anodes are used.

Another result of *Platemanship* in action, Nickel-Lume is available NOW. Complete details and instruction manual will be forwarded on request.

HANSON-VAN WINKLE-MUNNING CO. · MATAWAN, NEW JERSEY, U.S.A.

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BETTER-THAN-USUAL SERVICE

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HENDERSON

WOOD TUMBLING BARRELS

- BEST GRADE MAPLE or other woods to specification
- GREATER THICKNESS for longer life
- QUALITY FABRICATION by skilled and experienced workmen

A SIZE AND SHAPE FOR EVERY PURPOSE

8 to 14 sided barrels — 14″ to 38″ in diameter
Round barrels — all sizes
Horizontal barrels — various shapes and sizes

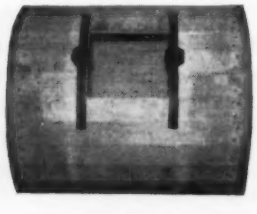
SPECIAL BARRELS

Where finishing specifications call for a different type barrel, Henderson Bros. is prepared to construct special equipment for practically any purpose.

ALSO barrels in steel, stainless steel, brass, Monel Metal and other alloys.

Large sided wood barrel

Small sided wood barrel



Horizontal wood barrel

Round wood barrel

SINCE 1880 DESIGNERS and BUILDERS of Tumbling Equipment

THE HENDERSON BROS. COMPANY
135 SOUTH LEONARD ST. WATERBURY 85, CONN.

plies the horizontal motion to the work through the cleaning and plating tanks and drying oven which surround the carriage.

A shaft running the length of the carriage, near its top, is fitted with gears which are meshed to racks on the work lifting arms. This assembly provides the vertical motion which lifts and lowers the work out of and into the tanks. Synchronizing the movement of the lifting arms with the horizontal movement of the carriage on which the arms are mounted provides the complete transfer of work from the loading station, through all operations back to the loading station for removal.

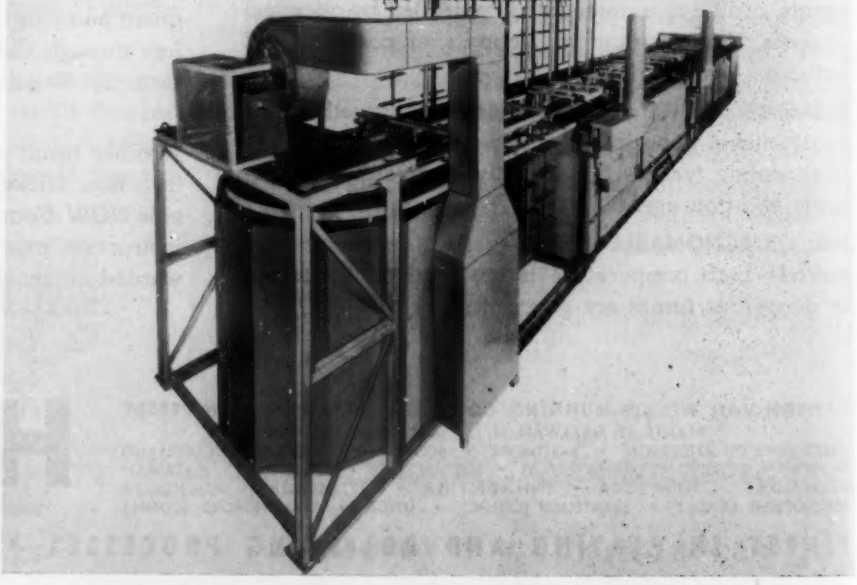
In operation, the plating baskets or racks are hooked to work carriers which are independent of the transfer mechanism. These carriers rest on two cathode rails, giving double contact and assuring constant current supply to the work. When the machine is set in motion, lifting arms lower at the loading station, the carriage moves to the left and pads on the lifting arms engage the work carriers. The arms raise, lifting the work, the carriage moves to the right a preset distance and the arms lower the work into the cleaning tank. While work is being moved on one side of the machine the arms on the other side are returning to their pickup position.

Maintenance of the machine is a simple matter as all working parts are located between, and higher than, the tanks. All parts can be lubricated from a central point at the loading station. There are no grease points or hydraulic couplings over the tanks, eliminating possibility of contamination of

revolutionary approach to the design of plating transfer machines, and holds much interest not only for those interested in plating but for anyone interested in automation.

The machine, now thoroughly tested in production, has no elevating super structure, no transfer cams, no chains or sprockets and no hydraulic fittings above the tanks. The transfer and conveying principle, around which the machine is built, has but two reciprocating movements, longitudinally and vertically, eliminating many complicated motions which have been accepted as necessary in all previously produced automatic plating machines.

All working parts are mounted on a central carriage which moves on a single track and is actuated by an hydraulic cylinder. Basically this sup-



tanks by grease dropping from fittings.

Two sets of controls afford flexibility for adjustment of timing of all, or parts of the complete operation. Adjustable hydraulic flow valves control speed of each movement. Adjustable electric interval timers allow for varying dwell time or adjusting hesitation at the end or beginning of an immersion movement.

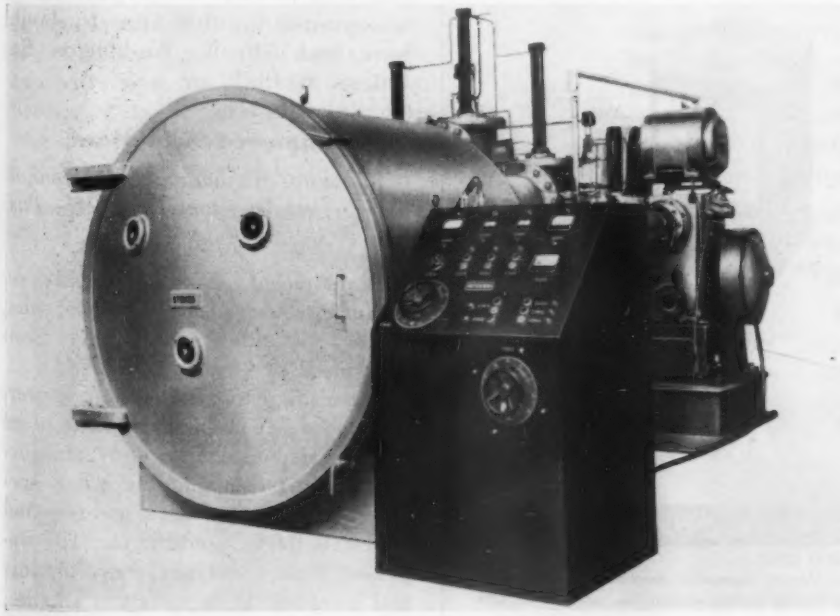
Because of the low power required and used, the machine will stall before any serious damage can result from jammed work. Efficient use of tanks makes possible the use of small tanks and a resulting saving in floor space and as there is no superstructure, longer racks or baskets can be handled under a minimum of ceiling height.

72-In. Vacuum Metallizer

F. J. Stokes Machine Co., Dept. MF, 5500 Tabor Road, Philadelphia 20, Pa.

Compactness in the layout of the vacuum pumping equipment and a high degree of automation in the control system with interlocks to guarantee safety and dependable operation are the noteworthy design features of the new 72-in. vacuum metallizing unit which has been developed by the company. The first of the new units, largest ever built for metallizing on an industrial production scale, has already been shipped to the Jayron Corp., Leominster, Mass.

Rapid pumpdown of the chamber, which is 72 in. in diameter and 60 in. long, is accomplished by a three-stage pumping system, comprising an 812-F 500 c.f.m. rotary mechanical pump for roughing, a 147-D six-inch booster pump, and three 14-inch 147-E oil diffusion pumps.



The pumping system, working as a unit, can evacuate the empty chamber to a pressure of ½ micron (normal working pressure for metallizing) in 7 minutes. By comparison, the 48-in. metallizer pumps down in 9 minutes.

Automatic Filter

Murray-Way Corporation, Dept. MF, Birmingham, Mich.

The above firm announces the development of a revolutionary, new automatic filter for all types of industrial filtration, which automatically rotates fresh filtering area into position while simultaneously ejecting con-

Smoothen

When scratch-free chrome plated finishes are required . . . *Smoothen* scratches with *SIEFEN'S S330* and *Sisals* before plating—then your finished product will be as smooth as the model's appearance.

J. J. Siefen CO.

5643 LAUDERDALE · DETROIT 9, MICH.

well worth having!

SIMONDS ABRASIVE CO.

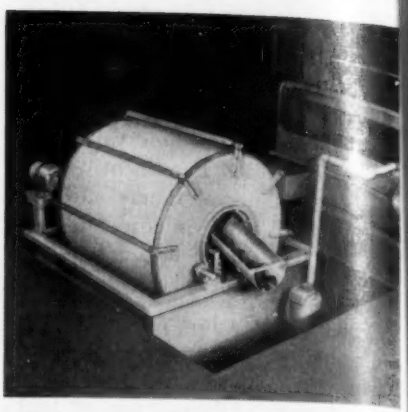
Abrasive Grain

Find out how, where and why Simonds Borolon abrasive grain is superior for *your* operations. This free bulletin describes grain sizes and types, lists recommended uses, and tells how to use Borolon grain on set-up wheels. It's the same top quality grain used in making Simonds grinding wheels, mounted wheels, points and segments. Write for bulletin ESA 198 and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.



taminant cake. Filtering screen material and size of screen opening can be supplied in Monel, stainless steel, brass or bronze to fit all requirements.

The new filter is unusually efficient and economical. It eliminates costly consumption of throw-away filtering media since the wire filtering screen has many times the life of the finest cloth filtering webs. Built to conserve valuable floor space, this compact unit offers unusually great filtering capacity in proportion to floor area occupied.

The filter may be used on an individual machine unit, or as a central filter for many units. The gallon capacity of filtration may be easily increased by adding filter drums in tandem — separately, or in the same tank to meet requirements. The new filter has been added as another standard item to the company's line of automatic polishing and buffing equipment.

Incorrect Address

In our August issue, on page 97, there appeared a write-up regarding the *Van Straaten Chemical Company's* new soak cleaner. The wrong address was printed for this firm. It should have been 546 W. Washington St., Chicago 6, Ill.

Improved Acid Hose

Raybestos-Manhattan, Inc., Manhattan Rubber Division, Dept. MF, Passaic, N. J.

Development of a hose highly resistant to a wider range of acids, salts, alkalies and other solutions has been announced.

According to the manufacturer, this improvement has been made in its Condor acid discharge and acid suction hose by compounding a new special synthetic with other acid-resisting materials for tube and cover. The improved hose withstands many organic and inorganic acids, salts and alkalies.

and plating solutions much longer than conventional acid hose, and can be used to convey other solutions previously not recommended for rubber hose. The tube of this hose is also claimed to be highly abrasive resistant to withstand slurries.

Bright Copper Process

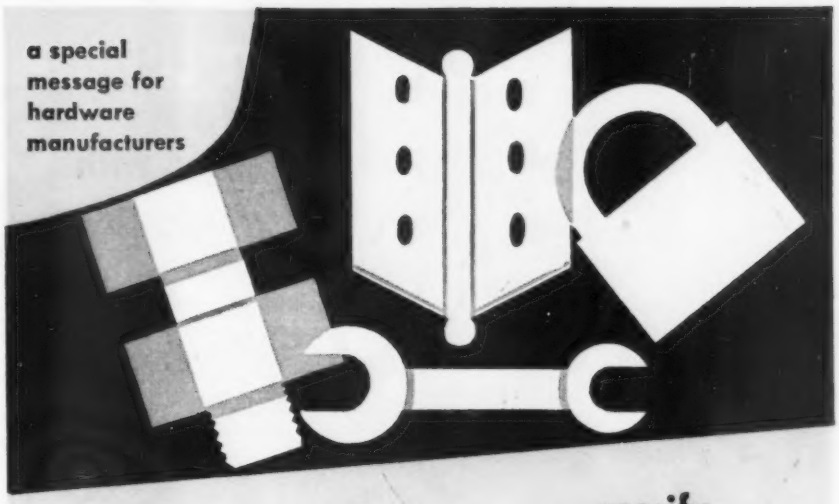
Smoothex, Inc., Dept. MF, Cleveland, Ohio.

A new bright copper process that increases plating production up to 60% has been developed recently according to *Lloyd Portzer*, president of the firm.

The new process is the outcome of long research in the company's laboratory by plating specialists who understand plating problems. They were searching for a new and different bright copper process made necessary because of government allocation of nickel. Many desirable characteristics are contained in this new process. It is faster, easier to control, extremely economical and readily adaptable for both large scale and average job shop production.

Operating expenses can be reduced with this new Smoothex bright copper process. There is no need for purchasing new plating department equipment since present equipment may be used. The process is 98% efficient. It saves nickel and eliminates the operation of copper buffing. Instant sparkling brilliance that occurs at the beginning of the plating cycle in a rochelle cyanide solution is noticed immediately. It has exceptional speed of deposition and excellent throwing power. Brightness is achieved over a much greater range from zero to eighty amperes per square foot. Ductile deposits and low copper concentrations are featured in this process. Periodic reverse or intermitting current may also be applied.

The new process was found to pro-



need a finish for protection—decoration—identification? specify IRIDITE®

Specify Iridite . . . for corrosion protection during storage or use . . . for a firm and lasting base for paint . . . for extra quality and eye-appeal . . . for low cost color coding of finished parts.

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

Iridite is approved under government specifications

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Manufacturers of Iridite Finishes for Corrosion Protection and Paint Systems on Non-Ferrous Metals, ARP Plating Chemicals.
WEST COAST LICENSEE: L. H. Butcher Co.

Wheels CUT FASTER, LAST LONGER

When treated with Park KOLD-GRIP POLISHING WHEEL CEMENT

KOLD-GRIP Polishing Wheel Cement, laboratory-controlled through every step of production, will arrive at your plant *ready for use!* Viscosity is constant, regardless of normal temperature variations and the cement can be applied directly from the container . . . *without mixing or heating.* Kold-Grip is clean, odorless and very easy to handle.

Coarse or fine-grain abrasives set up right for fast cutting efficiency. Substantial savings are effected through longer over-all wheel life, fewer setups and reduced wheel inventory.

Wheels dry rapidly, are unaffected by humidity changes, and may be stored in any convenient plant area.

Let our polishing engineer demonstrate Kold-Grip for you, or send for free sample, telling us the metal to be polished, grain sizes to be used, and drying facilities available. We can help you if we hear from you.

• Liquid and Solid Carburizers • Cyanide, Neutral, and High Speed Steel Salts • Coke • Lead Pot Carbon • Charcoal • No Carb • Carbon Preventer • Quenching and Tempering Oils • Drawing Salts • Metal Cleaners • Kold-Grip Polishing Wheel Cement

LICENSED MANUFACTURER: Electric Resistance Furnace Co., Ltd., Weybridge, Surrey, England

Park CHEMICAL COMPANY 1075 Military Detroit 4, Mich.

HARTFORD *TRIPLE ACTION*

CUTTING *and* TUMBLING BARRELS

for better work in less time!

For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO.

HARTFORD 6, CONN.

DETROIT	CHICAGO	NEWARK, N. J.	LOS ANGELES, CAL.	EXPORT
W. S. TURNER	VICTOR R. CLARK	GUARANTEE TRUST BLDG.	E. O. MALTBY CO.	R. A. RODRIGUEZ, INC.
445 NEW CENTER BLDG.	605 W. WASHINGTON BLVD.	972 BROAD ST.	1718 SOUTH FLOWER ST.	55 W. 42 ND ST., NEW YORK

duce top quality, more profitable bright copper plating results in tests and actual plating job production.

Water Circulating Pump

Hypro Engineering, Inc., Dept. MF, 404 No. Washington Ave., Minneapolis 1, Minn.

A new industrial pump with scoop rotor and rubber roller-type vanes, designed for production in bronze to meet continuous water recirculation requirements, has been announced.

Designated model 4300, the unit is engineered for continuous duty service through the use of sealed, permanently lubricated ball bearings. An additional feature is a pressed fit of the stainless steel shaft into the inner ball bearing race to restrict lateral movement of the rotor, minimizing end thrust wear within the pump. Performance tests have indicated friction losses are held to a minimum due to the unique design. A continuous 5000 hour test with water at 40 lbs. presure, utilizing design principles of the new Hypro pump, produced no measurable wear in the Hy-Car rubber rollers or the pump case.

The model 4300 pump impeller is self-lubricated by water and will deliver approximately 7 gals. per minute at 50 lbs. pressure and 1750 r.p.m. Pressure range is from 0 to 75 p.s.i. The new pump is furnished with ¾" ports, recommended speeds to 1800 r.p.m. Weight is only 4½lbs. net.

Phosphoric Pickling Process

Nielco Laboratories, Dept. MF, P. O. Box 4703, Detroit 19, Mich.

A group of pickling acids, known as the "Ferr-O-Niel" acid surface conditioners, has been developed by the above firm. This process which does not need a special and costly disposal system, is claimed to eliminate pollution, as well as the corrosion of adjacent equipment and buildings.

The iron phosphate can be spread

on the ground, to be absorbed and act as a fertilizer; dumped on city dumps; and, in some locations, flushed down the sewer, as it is insoluble.

This group of pickling acids is also said to be minus the corrosive and harmful fumes of sulfuric and hydrochloric acid, thus eliminating many hazards.

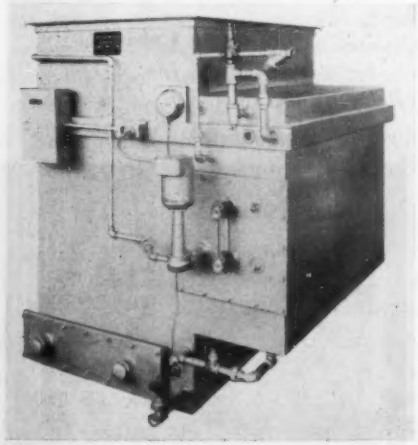
A technical data sheet covering this process can be obtained from the above firm.

Improved-Design Vapor Degreaser

Metalwash Machinery Corp., Dept. MF, 901 North Ave., Elizabeth 4, N. J.

The Metalwash improved design vapor degreaser incorporates features often desired but never available in the past. These features include: obstruction free tank walls, recessed condensing coils, removable pump chamber and water separator manufactured of solid stainless steel, one end maintenance and demand type control of water into the water condensing system.

The condensing coil commonly located around the interior walls of a vapor degreaser has now been recessed into a back compartment and the solvent condensate trough normally found under this coil has been replaced by a large sloped condensate tray also recessed and directly underneath the new type of condensing coil. This recessed multi-tiered condensing coil extends for the full length of the degreaser and is designed to give the

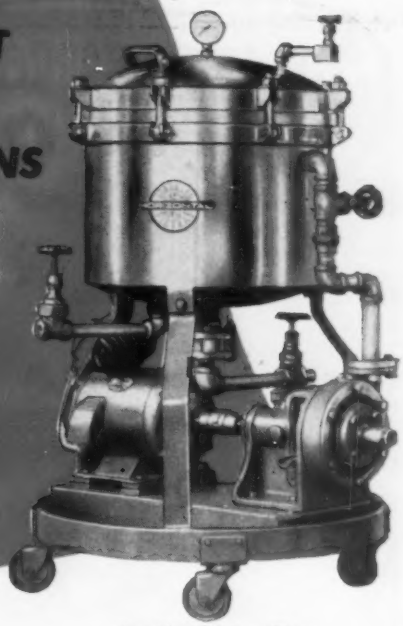


same efficient control of vapors as was formerly obtained with the coil completely around the tank interior. The coil also has the advantage of being easily replaced if and when necessary by the use of easy-to-reach compression fittings.

The over-size water separator and

FOR LOW COST FILTERING OF PLATING SOLUTIONS

SPARKLER HORIZONTAL PLATE FILTERS



Sparkler Plating Filter
Model 18-D-6 Alliron
600 G.P.H. Portable

HERE'S HOW

★ On a horizontal filter plate it is possible to apply a thin pre-coat with about one-third the filter aid, and in one-third the time required for pre-coating a non rigid media or a surface in a vertical position. This saves time and filter aid.

★ With the Sparkler horizontal plate you can apply this thin pre-coat evenly over the entire plate surface and start filtering immediately with less pressure and obtain maximum consistant clarity right from the start up to the end of the cycle.

★ A filter cake on a horizontal plate will not crack, slip or fall off even with varying pressure or a complete shut-down of the filter. No pre-coat renewal is ever required after an interruption in operation.

★ When it is necessary to clean the filter, the Sparkler filter tank can be emptied in a matter of minutes with a minimum of loss of valuable plating solution.

★ Any grade of filter paper from fine to coarse can be used in a Sparkler filter. This makes it ideal for carbon treatment of solutions. Carbon mixed with water in a stand-by tank is circulated through a clean set of filter paper on the plates until a carbon cake is formed. The solution requiring carbon treatment is then circulated through the carbon beds without contaminating the plating tank or a shutdown of plating operations.

★ At the end of the cycle with a Sparkler filter you can blow-down with air and produce a relatively dry cake that can be disposed of in a trash can rather than washing it down the drain with attendant sewer clogging problems.

★ You will find your Sparkler plating filter positive and dependable from a standpoint of uniform high quality filtering and economical in labor and material.

SPARKLER

Sparkler representatives in all principal cities are ready to give you personal service on your filtering problems, and show how you can make a material saving in operating cost.

MANUFACTURING COMPANY
Mundelein, Illinois

Sparkler International Ltd.
Prinsengracht 876, Amsterdam, Holland

Sparkler Western Hemisphere Corp.
Mundelein, Ill. U.S.A.

FOR EXTRA BARREL FINISHING SERVICE ...SEE YOUR HONITE DISTRIBUTOR!

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Metal Finish, Inc.
Newark, N. J.

M. E. Baker Co.
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Tumbling Products, Inc.
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Deburrco, Inc.
Philadelphia, Pa.

Gerrell Mfg. Co.
Cleveland, Ohio

Mosher Co.
Chicopee, Mass.

Precision Tumbling & Supplies Co.
Stratford, Conn.

Sundmark Supply Co.
Los Angeles, Calif.

Yes, these HONITE distributors are experts —men who offer you *advanced techniques* in every phase of barrel finishing.

Your HONITE distributor will process your samples—determine the exact size HONITE chip and kind of HONITE compound best suited for your needs. He will demonstrate the latest equipment to you. He can do job tumbling for you—by the carton or by the carload. Too, he can train *your* personnel in the best methods of handling barrel finishing equipment and supplies . . . and he has a large warehouse stock of HONITE chips and compound, ready for immediate delivery to you.

So call your HONITE distributor today. He'll show you that low-priced HONITE is the longest-lasting, fastest-cutting natural barrel finishing abrasive on the market. You'll see that no other barrel finishing abrasive—not even granite—retains its cutting edges as long as HONITE!

Ask about SUPER-HONITE

World's *Toughest* Abrasive Chip

Only chip engineered for *both* grinding and burnishing. Gives high luster finish in jig time because chips never crumble or pulverize.

Honite BRAND

Minnesota Mining & Mfg. Co., Dept. MF-113, St. Paul 6, Minn.
Yes, I am interested in HONITE Service.
☐ Send me free copy of booklet "3M Barrel Finishing"
☐ I'd like to have a HONITE Sales Engineer call on me

Name.....Title.....
Company.....
Address.....
City.....Zone...State.....

Made in U.S.A. by Minnesota Mining & Mfg. Co., St. Paul 6, Minn.—also makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.

3M COMPANY

pump compartment have been fabricated of solid stainless steel and welded to a flanged plate to permit removal of the complete unit to permit periodic inspection of the storage tank interior. This exclusive design permits the conversion of a straight vapor degreaser to a vapor spray degreaser by the customer.

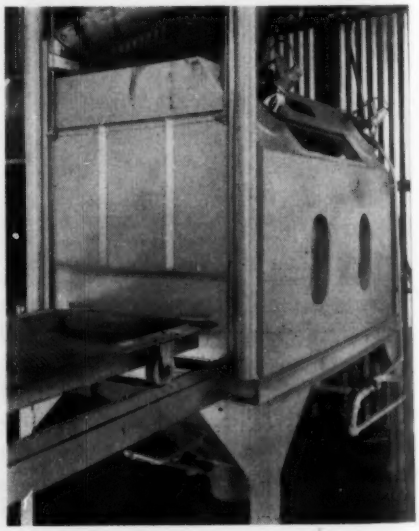
All service connections and clean-out openings are located at one end of the tank, making a neater installation and simpler maintenance. The degreaser may be placed in a corner of the room and all future service may be accomplished without moving the tank from its original location. The water condensing system, when used with a properly located automatic water temperature regulator minimizes the formation of atmospheric moisture, thus reducing the possibility of hydrolysis with the degreasing solvent. This reduction of moisture greatly extends the life of the degreaser tank.

The automatic water temperature regulator is so installed that maximum water is required only at times of maximum heat input, when no work is being cleaned. Work introduced into the degreaser results in the regulator throttling down so that only the proper amount of water is sent through the cooling system. This reduces water consumption as much as 75%. The regulator controls the temperature of the water in the coil as well as in the jacket, eliminating the possibility of extreme cold water entering the water jacket and causing the previously mentioned moisture condensation.

Wet-Blast Cabinet

Vacu-Blast Co., Inc., Dept. MF, Belmont, Cal.

The Belmont wet-blast cabinet is



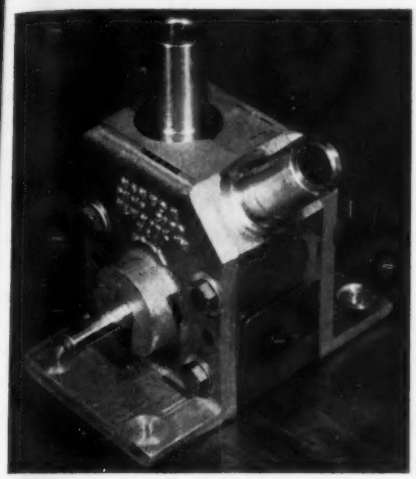
claimed to cut out costly hand cleaning methods by removing surface contamination and polish with a water-suspension (slurry) of fine abrasive.

The machine has no pump, thus requiring little maintenance and eliminating costly pump repairs. Another advantage claimed is the efficient blast gun, which throws more slurry at a higher speed and cleans faster than conventional suction guns.

A sample part may be sent to the above firm for cleaning and comparison with present methods employed.

Stainless Steel Pump

Vanton Pump Corp., Dept. MF, Empire State Building, New York 1, N. Y.

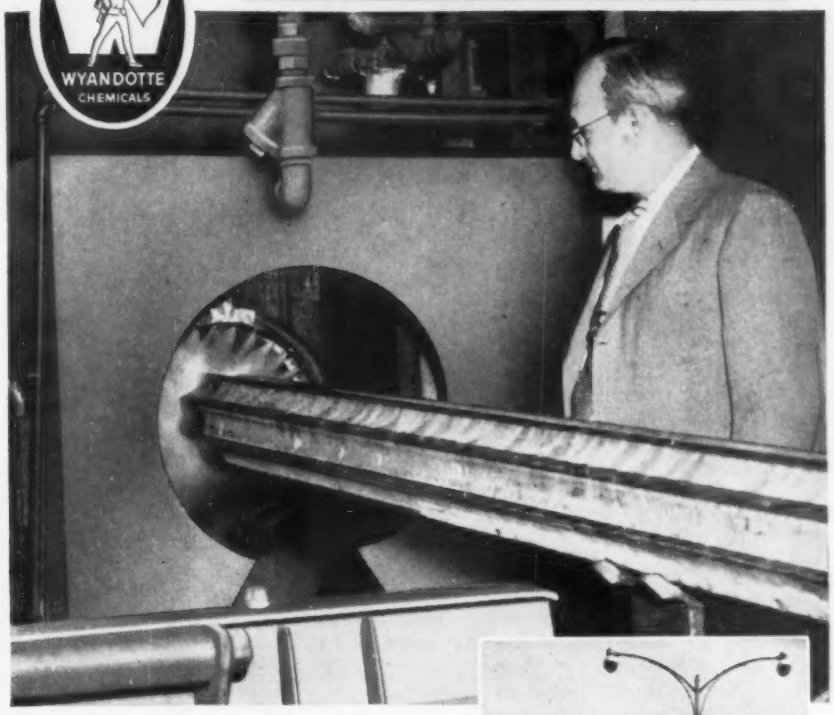


The availability of a new type of stainless steel pump was announced recently. Incorporating the unique features of the standard Vanton self-priming design, which eliminates stuffing boxes, gaskets and internal check valves, the new "S" series permits pumping of a wide variety of chemicals.

Since the only parts in contact with the fluid are the stainless steel body block and the corrosion resistant precision molded, durable, flexible liner, these pumps are particularly adaptable for extreme corrosive service and for the handling of liquids or slurries where contamination can not be tolerated. The wide choice of materials in which the flexible liner may be furnished, which includes gum rubber, natural rubber, buna N, Hycar, Neoprene, vinyl, silicone and Compar permits the user to select the best material for the application on hand.

The pumps are available in capacity ranges from ⅓ to 20 g.p.m. and for discharge pressures ranging from 0-60 p.s.i.g. with suction lifts up to 26″ Hg.

Pre-Fos for cleaning and phosphating



"Wyandotte PRE-FOS gives a better job—saves us money, besides!"

says W. K. Riemenschneider of Union Metal Mfg. Co.

"We use metal cleaning and phosphating products in manufacturing street lighting standards, materials handling equipment, etc.," reports W. K. Riemenschneider, factory manager of Union Metal Mfg. Co., Canton, Ohio.

"Formerly, we spent about four times as much for materials as we now spend for Wyandotte PRE-FOS!

"PRE-FOS also gives us better cleaning and paint adherence, has eliminated hard water scaling, gives us a cleaner operation."

Will not corrode

Wyandotte PRE-FOS* is an amazing phosphating cleaner that deposits a fine-grained phosphate coating on the metal which is ideal for a paint base. PRE-FOS performs well in hard or soft water, in spray washer or soak tank. It rinses freely and completely, prevents rust of in-process steel parts.

Ask your Wyandotte representative to demonstrate what PRE-FOS will do for you in your plant. Also ask him for help with any of your cleaning problems. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Angeles 12, California.*

CLEANING THE WORLD

*Reg. U.S. Pat. Off.

Largest manufacturers of specialized cleaning products for business and industry

Wyandotte CHEMICALS

Helpful service representatives in 138 cities in the U.S. and Canada

TO HELP
SOLVE YOUR
PRECIOUS METAL
PLATING
PROBLEMS . . .
Our Research Staff develop the anodes and the precious metal salts plating materials you need for best results. They also are available for consultation—to help minimize your costs or improve efficiency in your plating procedures.
We think of both as equally important services and APW welcomes requests for either one or for both. No charge for the technical service—we just want to be sure you use it—freely.
A partial list of APW plating products:
A. A. SILVER ANODES
POTASSIUM SILVER CYANIDE
SILVER CYANIDE
C. P. SILVER NITRATE
Meets A.C.S. Specifications
Write for information and current quotations
THE AMERICAN PLATINUM WORKS
231 New Jersey Railroad Avenue • Newark 5, N.J.
APW

Self-Cleaning Dust Collector

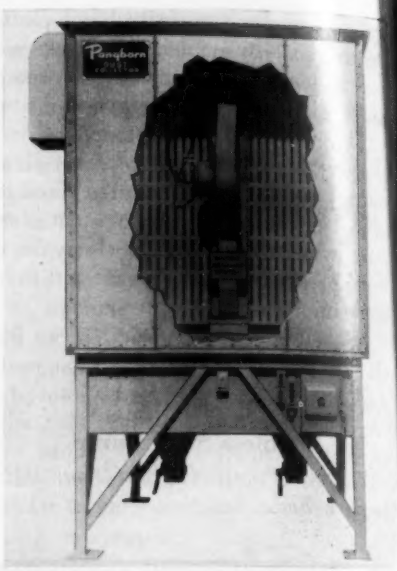
Pangborn Corp., Dept. MF, Hagerstown, Md.

The manufacturer announces the production of the new type CH-3 self-cleaning cloth screen dust collector. This unit lowers operating and maintenance costs by permitting continuous automatic dust collection, constant air volume and suction, and positive reverse flow filter cleaning.

The CH-3 collector uses the principle of reverse air flow for continuous cleaning of its cloth filters. This is accomplished by action of a traveling manifold whose integral reverse air blowers takes its air directly from the clean air side of the collector.

In operation, the manifold covers three vertical rows of cloth-covered screen frames at one time. The reverse flow of air is blown through the center row of screens while normal air flow through the other rows is blocked off. The blocking action is accomplished by the flexible diaphram on the manifold which is inflated against the grid wall under flow of pressure when the blower unit is centered on a particular row.

This mechanical arrangement causes the dust to be blown from all external surfaces of the filter elements and allows it to drop into the hopper instead of being re-entrained. This arrangement also prevents air short circuiting. The blower motor in the traveling manifold is interlocked with the main exhauster motor to insure



simultaneous operation.

The manifold travels at slow speeds in both forward and reverse directions. This is accomplished by a reducer and a fractional horse-power motor controlled by a limit switch and magnetic reversing starter. Because the collector operates continuously, there is no need for shut downs for mechanically cleaning the units. Also, because dust accumulation on the cloth surfaces is now maintained at a uniform value, the air flow resistance of the collector remains relatively constant.

Standard sizes of the collector are furnished with six-screen-high construction. Also available for small air volume problems are four and five-screen-high by five foot long screen sections. Existing installations of type CH cloth screen collectors can be converted to the self-cleaning arrangement by removal of the mechanical rapping mechanism, replacement of the grid wall, and slight alterations to the screen frames and clamping devices.

Other features of the collector are: (a) all steel wire mesh screen frames, which prevent cloth collapse under air load; (b) screens of convenient size and weight for easy handling by one man; (c) cloth filter bag of simple design that can be applied without tension or strain; (d) inherent electrical grounding on screen frames; (e) all moving parts of cleaning mechanism located on clean air side, thus eliminating wear; and (f) accessibility on both dust and clean sides for inspection, thus insuring low maintenance and long life.

Electronic Level Control has no Moving Parts

Fielden Instrument Div., Robertshaw-Fulton Controls Co., Dept. MF, 2920 N. Fourth St., Philadelphia, Pa.

The new Tektor level control is an improved capacitance unit with no moving parts. A simplified electronic circuit operates by a change in the electrical capacitance of the electrode caused by the approach of any material that flows. This instrument provides control as close as $\frac{1}{16}$" of liquid, divided solid, interface, conducting or non-conducting, wet or dry materials. Electrodes are rigid rods or discs which may be completely sheathed in corrosion resistant material.

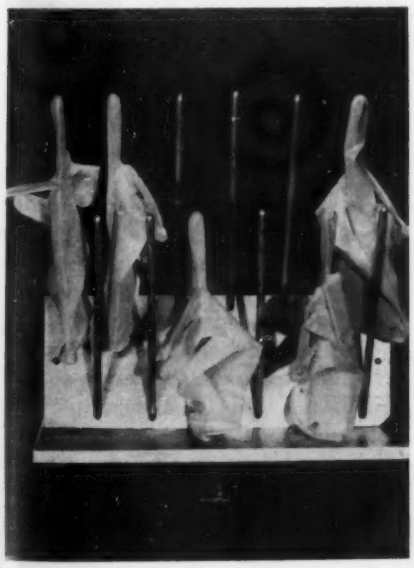
New models 101 and 102 are Fail-Safe, low level and high level respectively. New features include trimmer adjustment, accessible without removing cover for simpler installation and set-up. Only a single radio tube is employed. The unit is completely stable, highly sensitive and is designed for long life with minimum maintenance. The instrument operates on 115 volt 60 cycle power supply.

Glove Dryer

General Scientific Equipment Co., Dept. MF, 2700 W. Huntingdon St., Philadelphia 32, Pa.

Used for drying rubber gloves, made of aluminum throughout and provided with a drip pan and draining faucet; the complete unit is mounted on a sturdy wooden base in mahogany finish for easy attaching to wall.

Model No. 38 with 12 prongs to dry 6 pairs of gloves $22.50. Model No. 40 with 24 prongs to dry 12 pairs of gloves $37.50.



Universal Pallet Dolly

Roll Rite Corp., Dept. MF, 801 Jefferson St., Oakland, Cal.

Maneuverability, ease of operation and proven ability to roll on rough or slatted floors are the advantages of the improved universal pallet dolly.

Twenty-four 6" wheels support the load and provide surface contact on rough surfaces. The large diameter wheels roll easily under load and are available with rubber tread or aluminum alloy tread to fit operating conditions.

Front and rear wheels are mounted on spring loaded axles to assist in guiding the loaded pallet and to allow 360 degree turning.

Standard production sizes are 30" x 40" and 40" x 48". Larger sizes can be supplied. Engineering Bulletin 310-40, with complete details of construction and uses will be mailed upon request.

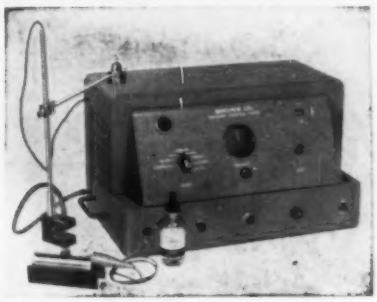
Metal Spray Gun

Vandersee Engineering Co., Inc., Dept. MF, 727 W. 7th St., Los Angeles, Cal.

A metallizing machine incorporating a new nozzle and other basic improvements has just been announced. The new nozzle eliminates the need

HERE'S WHY

it's easier to do your thickness testing with the



KOCOUR Electronic Thickness Tester

1. Thickness testing is no longer a tedious, time consuming task. Tests require only about a minute to make.
2. Very simple to operate . . . no highly skilled technicians are required.
3. The instrument is virtually automatic . . . readings are direct . . . the human element does not affect the accuracy which ranges from 90-95%.
4. The minimum thickness which can accurately be determined is 5 millionths of an inch (5 ten-millionths of an inch for chromium).
5. Requires no graphs, no charts, no standards or calculations.
6. Magnetic properties of either the base metal or the plating do not affect the test in any way.
7. Guaranteed satisfaction.

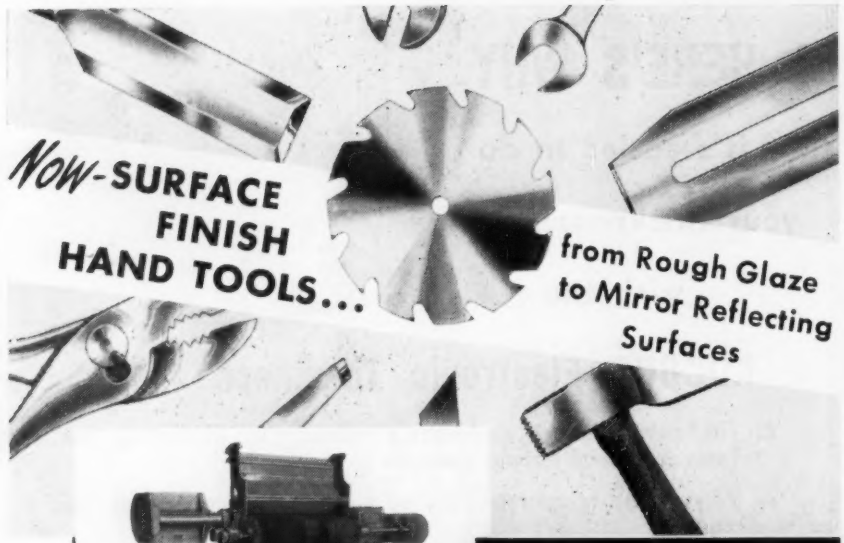
• **Operation 105-125 Volts, 60 cycle A. C.**

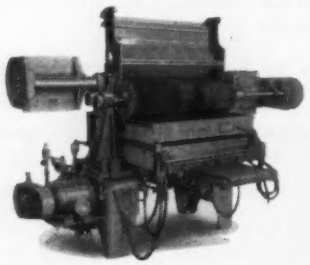
~ ***Write today for complete information*** ~

KOCOUR CO.
4802 S. St. Louis Ave.
Chicago 32, Illinois

• *Pioneers & Specialists in Test Sets & Instruments for the electroplating industry since 1923.*

Specify* KOCOUR TEST SETS *from your supplier.





CLAIR
MODEL 206-A
SURFACE FINISHING MACHINE

FLAT OR CONTOURED PRODUCTS SURFACE FINISHED WITH PRECISION

Wrenches, pliers, screw drivers, ax heads—these and other hand tools can be surface finished most efficiently with a Clair Machine. The Model 206-A, specifically developed for this type of service, is equipped for either magnetic or mechanical holding fixtures. Providing a working surface 38" wide and buffs from 3" to 12" in diameter . . . this versatile machine operates on a principle thoroughly proved in many surface finishing operations.

Write for details!

CLAIR MANUFACTURING CO., INC.
Specialized Machine Equipment For Glazing and Polishing Operations
OLEAN, N. Y.

for manual adjustments by the operator and assures an even flow of metal to the surface being metallized.

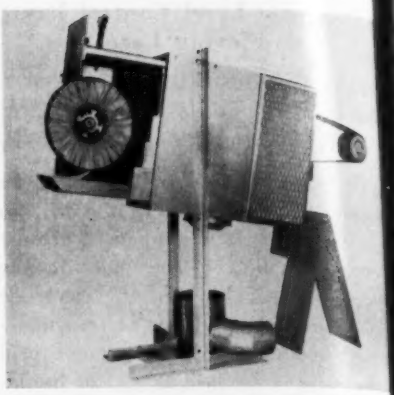
Designed to be trouble free, all the bearings for the wire feed mechanism are encased in the main body gear case casting, giving perfect gear alignment and thus can be easily repaired by semi-skilled workmen on the spot. Another big improvement of the Vanco metallizing machine is the gas mixing chamber which is built in the nozzle at the point of combustion, completely eliminating backfire.

Unique Self-Filtering Hood

Slonneger Products Co., Dept. MF, 1524 Milburn Ave., Dayton 4, O.

A revolutionary new-type self-filtering hood, engineered for buffing and polishing wheels and belts, has just been introduced. Utilizing a new principle, dust is withdrawn and controlled by the wind created by the revolving buffing or polishing wheel or belt.

Known as the Elim-O-Dust, the hood is designed to remove minute amounts of dust and dirt down to 0.02 micron in size. It is claimed to save up to $800 in heat, power, maintenance and space costs in a ten-year period. Snagged parts are deflected by the air foils preventing serious injury to operators. The danger of dust-laden exhaust ducts is also eliminated by the unit. Filters used in the wood facilitate the capture of valuable metals



which are thus reclaimed and used again.

The universal hood can be adjusted to any height spindle and to any angle. It is designed to accommodate straight back or floor level back stands for polishing belts. The standard hood will accommodate wheels up to 18" in diameter and 9" wide; hoods may also be designed according to individual specifications.

Wheel shrouds are adjustable so the operator can work under, on top of, or on the side of the wheel. The filter section can also be removed and the hood connected to a plant's existing exhaust system. In this manner, such a system will be boosted by the blower action of the product. The cost: Basic Hood — $100.00; Belt Features — $20.00; Filter — $30.00; Total Cost — $150.00.

Portable Polishing Head

Grinding & Polishing Machinery Corp., Dept. MF, 2530 Winthrop Ave., Indianapolis 5, Ind.

A new "bantam weight" Vonnegut portable polishing head for contour finishing of metal, wood, plastic or ceramic workpieces has been added to the above manufacturer's line.

The new head weighs just two pounds. Featuring 12 brushes and 12 relatively narrow strips of abrasive—each only 1½ inches wide — and a diameter of only 6½ inches — the head requires less power than the larger 16 and 32 brush heads, permitting the use of smaller power tools. A variety of adaptors are made for applying the head to almost any type of small power tool up to 3,500 r.p.m.

In addition to its advantages of light weight and use on lighter portable tools, the small diameter of this 12 brush head lets it get into concave areas of smaller radii than can be reached with the larger heads. Action of the polishing head, according to the

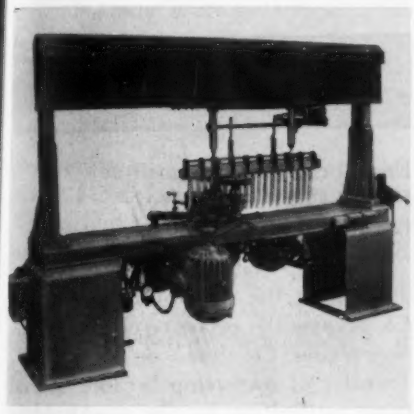
ompany, is such that it forces the brasive into contours and depressions f the work piece without cutting down he higher areas of the pattern.

Automatic Buffing Machine

Clair Mfg. Co., Dept. MF, 1009 S. Union St., Olean, N. Y.

A new surface finishing machine for performing necking operations on spoons, shouldering operations on knife blade bolsters and similar applications has been developed by the above company.

Construction of this unit — the Clair Model 207 Shouldering Machine — allows loaded 38" work racks to be transferred from other Clair surface finishing machines for the application of a 90° angle cross buff. This provides coverage on both sides of the spoon or knife in many radii and angles impossible of access with conventional glazing and polishing equipment.



Although radically different in appearance, this shouldering machine incorporates identical interchangeable wearing parts common to all company surface finishing machines. Two 3-horsepower, 1800 r.p.m., totally enclosed dust-proof motors provide buff speeds up to 3600 r.p.m. The horizontal stroke of the work racks, through and clear of the buffs is adjustable from 0" to 44". An independent lever adjustment permits either of the two buffs to be lowered or raised through a 1" range.

Uniform floating contact between the buffs and the work at any predetermined setting of an automatic pressure regulator is provided by a roll pressure control air cylinder. This unit also actuates the buff arbors from the open to closed position. To compensate for either off-center work or a difference between the diameters of the buffs being used, a hand crank can be used to move the center line of contact between buffs either right or left. Independent hand crank adjustments permit individual tilting of buff arbors through 12½° arcs to permit buffs to contact work at any angle falling within that range.

Among other features are anti-friction bearings throughout, independent adjustable speed control valves in all circuits, and an emergency safety control which instantaneously actuates buffs to open position clear of work and work racks.

A variety of optional equipment also can be supplied, including an assembly to provide vertical oscillation of work rack, cleansing jets, dust collector guards and v-belt safety guards.

Produces mirror-like deposits regardless of thickness

..... without scratch brushing or buffing.

the revolutionary Sel-Rex®

BRIGHT GOLD PROCESS

Hundreds of firms tested SEL-REX Bright Gold Process and all enthusiastically adopted it as their new gold plating standard. There are many reasons . . . here are a few:

- Excellent "throwing power" and metal distribution.
- Produces fine grain deposits, double the hardness of conventional gold.
- Eliminates the need for scratch brushing or buffing.
- Ideal for specification plating.
- Operates at room temperature.
- No complicated equipment required. Conventional racking may be used.
- Solution is stable and easily maintained.

Packaged in 1, 5 and 10 ounce bottles.

SAVE *time and money...* investigate the new Sel-Rex Bright Gold Process!

MAIL COUPON TODAY!

Sel-Rex Precious Metals, Inc., Dept. MF-11
229 Main Street • Belleville 9, N. J.

☐ Send trial order of 1-ounce of Sel-Rex Bright Gold Salts.

☐ Mail complete literature and prices.

☐ Mail information on SEL-REX Silver Sol-U-Salt, Gold and Rhodium.

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Company .....
P. O. No. .....
Address .....
City ..... Zone ..... State .....

Heavy-Coated Abrasive Belt

Minnesota Mining and Mfg., Dept. MF, 900 Fauquier St., St. Paul 6, Minn.

A new type heavy-coated abrasive belt to be sold under the trade name "Three-M-ite" Multicut cloth belt, has been announced. Combining the polishing characteristics of hand-coated glue and grain set-up wheels and belts, the new 3M belt offers all the advantages of a coated abrasive belt manufactured under controlled factory conditions, according to the firm.

Originated by the company to replace set-up wheels and belts, it is expected to find wide use throughout the metalworking field in such markets as the manufacture of hand tools, cutlery

Tops for Quality and the top tells why!

Do we *ever* make a batch of Chromic Acid less than 99.7+% pure? Every so often we do. But when that happens, right out on the dump it goes —and good riddance.
The top label says "Extra High Quality" and that's what every drum contains. We think you'll like the uniform quality of our product and the way we make good on our promises. When you're in the market, why not call us?

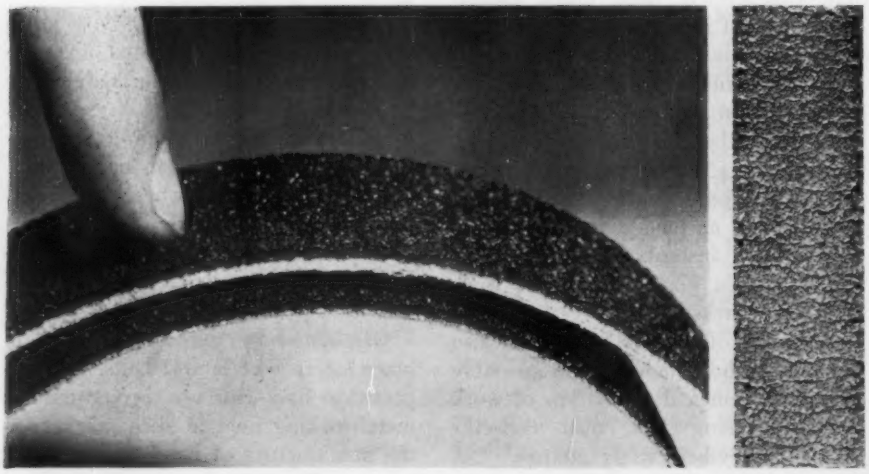
99.7+% Pure
Consistently low in chlorides, sulphate and insolubles. More than meets every requirement of the electroplating industry, as well as U. S. Government Specification AN-A-21 and Federal Spec. OC-303.

PAINTS · PLASTICS · CHEMICALS · BFC

BETTER FINISHES & COATINGS, INC.
268 Doremus Avenue, Newark 5, N. J. • 122 East 7th St., Los Angeles 14, Calif.

and surgical instruments. Preliminary field tests have shown that use of the new belt increases production with additional economies in polishing costs, the firm stated.

The heavy mineral build-up of the Multicut belt opens up under work pressure, presenting fresh abrasive grain particles to the work piece. This condition may be compared to "cracking", as known in the polishing field when glue and grain coated set-up wheels and belts are used.



The new belt is said to retain all the advantages of a factory coated polishing member — precision coating, scientific mineral orientation, factory control, and flexibility of use.

It eliminates the cost and need for making hand coated set-up products, and frees both manpower and space for more productive plant use. In addition, new belts can replace worn belts conveniently and quickly, and the polishing is accomplished with higher color and less wild strikes, as well as smoother operation.

The new belt is available in grit 60 and grit 150 aluminum oxide mineral in all standard widths and lengths. It can be obtained through distributors of coated abrasive products or through company branch offices.

BUSINESS ITEMS

Engelberg Buys Complete Porter-Cable Abrasive Grinder Line

The industrial abrasive-belt grinder division of the *Porter-Cable Machine Co.* became the property of the *Engelberg-Huller Co., Inc.*, on October 1. Transfer of ownership became official upon ratification by the stockholders of the two Syracuse companies.

The addition of the Porter-Cable group of 15 grinders established Engelberg-Huller as the leader in the industry, with the most complete selection of abrasive grinding and polishing equipment on the market.

Acquisition of the Porter-Cable line is the second of two major purchases made by Engelberg Huller within the past year. In 1952 the company bought the complete *Rome Machinery Sales and Engineering* series of polishing lathes and automatic buffing and polishing equipment.

According to *John T. Schenck*, Engelberg president, prompt service and delivery of parts has been provided for during the entire period of moving and consolidation of manufacturing equipment in their new location at the Engelberg-Huller plant.

Describing overall plans for the in-

egration of the new lines, Mr. Schenck emphasized that the full line of Porter Cable machines and accessories as presently known to the trade will continue to be available. In addition, the new owner plans to offer special holding fixtures and jigs to meet the particular requirements of belt grinder customers. Preliminary surveys indicated that this new service will prove most popular with present and prospective users of the Porter-Cable line.

Engelberg will maintain experimental grinding laboratories for test work on samples submitted by customers seeking the most economical and efficient materials and methods. *John Simmons*, for six years methods engineer at Porter-Cable, will assume a similar post at Engelberg-Huller.

Distribution operations will be carried out under the same policies and through the same distributors as with Porter-Cable, said Schenck. Additions to the line are scheduled for early production and will be announced through trade journals and distributors in the near future.

Livingstone Engineering Appoints Petzinger

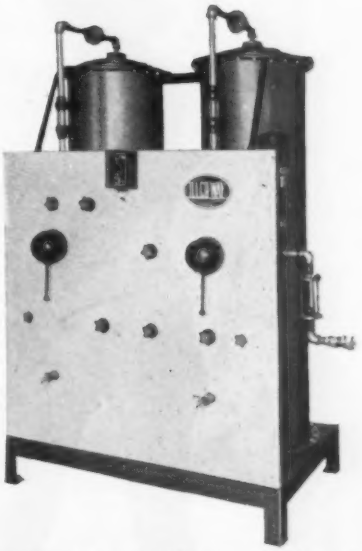
Livingstone Engineering Co., Worcester, Mass., manufacturers of Speedylectric boilers and steam-jet cleaners announces the appointment of *L. E. Petzinger* of *Petzinger Engineering Co.* as field engineer for northern Ohio. He will make his headquarters in Cleveland.

PURE WATER FOR PLATING
AT A FRACTION OF FORMER COSTS

by ionXchange

Water that's solids-free is trouble-free

Records show that more and more fabricators and finishers are finding a short cut to a better product at *lower cost* by installing an ILLCO-WAY De-ionizer.... De-ionized water in rinsing or plating operations assures greater quality control and more operating economy .... Investigate also our new Chrome Purifier for recovery and purification of chromic acid anodizing or plating solutions. Write for literature.



MODEL LU standard (Package-type) unit for production of solids-free De-ionized Water. Units completely assembled and tested in factory . . . shipped completely assembled, requiring minimum installation.

ILLINOIS WATER TREATMENT CO.
856-11 Cedar St. • Rockford, Illinois

ILLCO-WAY

Belke Manufacturing Thirtieth Anniversary

Commemorating *Belke Manufacturing Company's* thirtieth anniversary, employees presented large cast bronze model of the company trade mark to *William E. Belke*, president and founder. Seated, left to right, *Harvie Johnson*, *Ralph Belke*, *William E. Belke*, and *Larry Verfurth*.

Harry Hariton Made Wagner New York Area Representative

Harry Hariton, of Forest Hills, N. Y. has been appointed sales representative of *Wagner Brothers, Inc.*, Detroit, warehouse suppliers to the electroplating industry, for the New York Metropolitan area, by *John T. Tebben*, vice-president in charge of sales.

He will cover New York City, Long Island and Northeastern New Jersey, with an established line of automatic, semi-automatic and hard chrome unit platers, rectifiers, agitators, anodes,

SPEEDIE

SATIN FINISH

BETTERS RIGID SPECIFICATIONS OF NOTED GOLF CLUB MANUFACTURER

—and if jobs in *your* buffing shop require the use of a superior greaseless composition—you, too, will get "greater mileage" from *Speedie* Satin Finish.

It has excellent adhesive character! An added advantage is the help it gives the buffer. Since the compound is colored *red* the buffer knows at all times how much he has on his wheel, thus reducing amount of compound used.

Whether you want a coarse *Speedie* Satin Finish for polishing or an exceptionally fine one for jewelry work, here is the answer to your greaseless problems. Available in all size grits from No. 80 through No. 400.

Write today on your company letterhead for samples of the *new and improved Speedie* Satin Finish, advising size grit required. And while you're at it, why not investigate the *full* line of Buckeye's outstanding *Speedie* Buffing and Polishing Compositions?

POLISHING ROOM SUPPLIES AND EQUIPMENT

BP

THE BUCKEYE PRODUCTS CO.

7033 Vine Street Cincinnati 16, Ohio

Cable address: Buckprod

Harry Hariton

containers, tanks, tank linings, solutions and supplies.

Hariton, a chemical engineer, was formerly sales manager of *Empire Electro Plating Supplies Corp.* of New York.

Protiva Appointed by Heil

The appointment of *Richard F. Protiva*, as district sales engineer, has been announced by *E. W. Vereeke*, general sales manager of *Heil Process Equipment Corp.*, 12901 Elmwood Ave., Cleveland 11, Ohio.

Mr. Protiva received his metallurgical engineering degree from Case Institute of Technology, and has had approximately thirteen years' experience in the sale and service of chemical process equipment in this territory.

Richard F. Protiva

He will be responsible for all sales in the eastern portion of the home territory, and is well qualified to recommend the company's corrosion-proof equipment, which includes chemical-proof tanks, tank linings, heat exchanger equipment, lead anodes, steam jet agitators, and plastic exhaust hoods and duct work.

Burleigh Joins National Research

Harold C. Weingartner, vice-president and general manager of the Equipment Division of *National Research Corp.*, announced the appointment of *Theodore E. Burleigh* to the sales department as a sales engineer.

Mr. Burleigh will be concerned with technical sales matters relating to gas ballast mechanical pumps, recently introduced by the company for the first time in the United States. Gas ballast mechanical vacuum pumps are unique in their ability to handle water vapor with undiminished efficiency. The elimination of water vapor contamination in vacuum pumps contributes to greater convenience and economy in all types of high vacuum processes.

Burleigh was formerly with the Kinney Mfg. Co. of Boston since 1947 where he handled the New England and Canadian territories. He is a native of New England and currently resides in Winchester, Mass.

Allied Research Appoints Richards

Allied Research Sales Corp., a subsidiary of *Allied Research Products, Inc.*, manufacturers of the nationally known line of Iridite protective finishes and ARP plating chemicals, has announced the appointment of *Tom*

Tom Richards

Richards as its representative in Cincinnati, Ohio.

Mr. Richards' headquarters will be at 426 Transportation Building, Cincinnati. From that location he will serve manufacturers in the Southern Ohio-Indiana-Northern Kentucky area.

Knapp Mills Forms Mexican Company

Knapp Mills Inc., leading American producer of lead clad steel and lead clad copper, has announced the formation of *Knapp Mills de Mexico, S. A.* with headquarters in Mexico City.

The new firm has entered into a contract with the principal Mexican lead products producer, A. Valezzi Sucs., S. A. Under the terms of this contract the new firm will acquaint Valezzi with all of the knowledge, skills and methods required to produce the highest quality lead products. In return, Knapp Mills of Mexico received an exclusive contract for the distribution and sale of such products in Mexico and the United States. This arrangement will eliminate the wasteful practice of shipping Mexican lead to America only to be fabricated and shipped back to Mexico in finished form.

Knapp Mills of Mexico is jointly owned by Knapp Mills Inc., New York City, Dominicis, S. A., and by Guillermo Barroso, Sr., who in addition to owning A. Valezzi Sucs., S. A. is a director of the Bank de National of Mexico, Director of Viscosa Mexicana, and a leading Mexican textile producer.

McCune General Sales Manager of Norton Co. of Canada

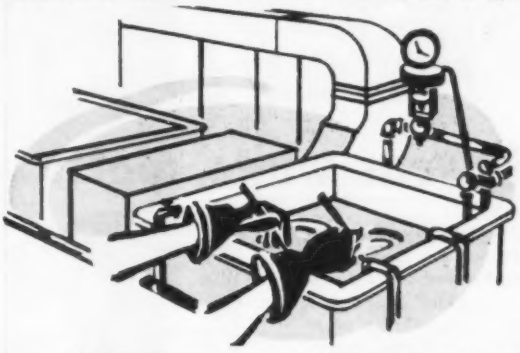
W. Alexander McCune, Jr. has been appointed general sales manager of *Norton Company of Canada, Ltd.* A former abrasive engineer in the northern New Jersey area, Mr. McCune will assume his new duties November 1. He will succeed *C. W. Fell* who will become an abrasive engineer in the Toronto area. Ill health has forced Mr. Fell to take a less strenuous part in the company's sales program.

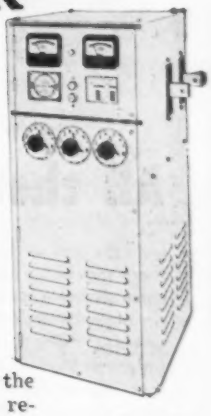
Winton A. Vagedes has been appointed an abrasive engineer and will assume Mr. McCune's former territory. He is a former department manager and abrasive specialist at the C. W. Marwedel Co. in San Francisco, a Norton distributor. He is presently completing a company training course.

Mr. McCune has been with the company since 1940 except for two years

W. Alexander McCune, Jr.

No Guesswork Here . . .
It comes out right
RICHARDSON-ALLEN
SELENIUM RECTIFIER





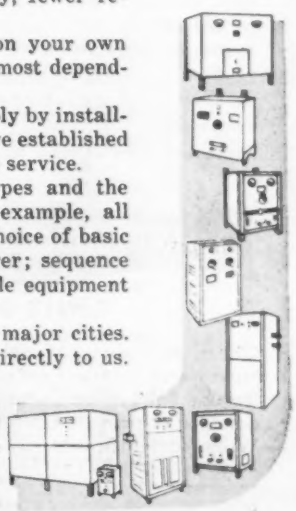
When "it comes out right" consistently, you know the satisfying result — greater output, highest quality, fewer rejects, lower labor costs.

This profitable achievement depends not only on your own skill and ability. It also requires and deserves the most dependable rectifying equipment.

You can assure the dependability of your d c supply by installing Richardson-Allen Selenium Rectifiers which have established records in hundreds of plants for long, trouble-free service.

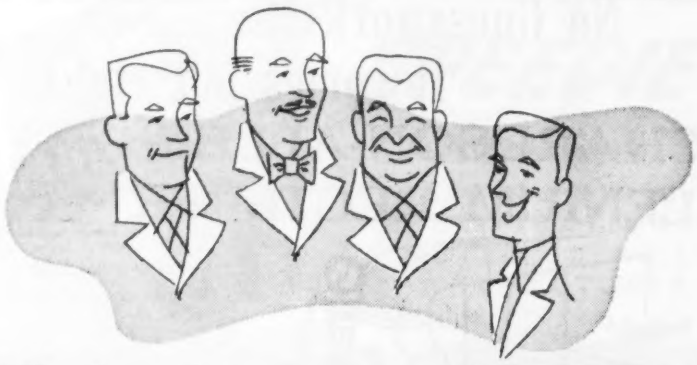
The Richardson-Allen line includes various types and the widest selection of voltages and currents. For example, all models may be standard or plus rated; there is a choice of basic and remote controls; self-contained; heat exchanger; sequence programming controls; anodizing, and also suitable equipment for manodizing.

There is an R-A factory representative in most major cities. If you do not find him in your phone book, write directly to us.



RICHARDSON-ALLEN CORPORATION
a manufacturing affiliate of
WESLEY BLOCK AND COMPANY, 39-15 MAIN ST., FLUSHING, N. Y.
IN CANADA: Richardson-Allen of Canada, Ltd., 370 Victoria St., Toronto, Ont.

LEADING POWER CONVERSION SPECIALISTS



All chemists wear white coats!

Unlikely and unimportant but even if they look alike there's an important difference between them. KLEM chemists have dealt with almost every conceivable problem in their field. Their extensive experience enables them to more readily comprehend plant situations than ordinary chemists. The KLEM laboratory, equipped with the finest technological equipment for duplicating exact plant conditions and procedures, enables them to determine the correct answer to tough problems.

Let us help eliminate your bottlenecks, assist you as we have others in establishing profitable production schedules.

Representatives in most industrial areas.

3 OF 20 STANDARD KLEM PRODUCTS

KLEM STRIPPER No. 73—Heavy duty hot stripper for paint and enamels, rinses easily, eliminates hand scrubbing.

WATER WASH COMPOUND No. 203—Stops corrosion, keeps lines clean, prevents adhesion of paint to water curtain. Excellent for recovery.

RUST-SOL No. 124—Concentrated phosphoric acid surface conditioner. Removes oil and rust. Provides slight etch to promote adhesion of paint. Meets USA 3-213, TAC-ES431 and MIL-C-10578.

KLEM PRODUCT of the MONTH

MINIT KOTE

Cleans, neutralizes, phosphatizes in 60 seconds. Frees metal surfaces from all traces of oil and dirt. Deposits light, uniform, phosphate coating for better adhesion of paint to ferrous metals and aluminum. Write for details.

KLEM Chemicals Inc.
14401 LANSON . . . DEARBORN, MICHIGAN

during the War when he served as a Naval officer aboard a destroyer escort. A graduate of Dickinson College, he is a member of the *American Society of Tool Engineers, American Society of Carbide Engineers,* and active in Masonic circles.

Metal Finish, Inc. Appoints Yacus

Election of *Steve Yacus* to the position of secretary-treasurer of *Metal Finish, Inc.,* 410 Frelinghuysen Ave., Newark 5, N. J., has been announced by *Paul E. Kirchartz,* president of the firm. The company, distributor for *Minnesota Mining and Mfg. Co.'s* "Honite" barrel finishing abrasive chips, compounds and equipment, operates a completely equipped production shop.

A native of Newark, N. J., Yacus attended Newark Central high school,

Steve Yacus

and is a graduate of General Motors Institute, Flint, Michigan, B.S. (M.E.) 1944, and in 1948 completed post graduate work receiving the degree of Bachelor of Industrial Engineering from the same institution.

His thesis, "Metal Finishing of Automobile Bodies," attained publication, and Yacus was with Buick-Oldsmobile-Pontiac Division, General Motors Corp., at Linden, N. J., Wilmington, Del., and Atlanta, Ga, as superintendent of metal finishing until 1949. He was most recently employed as sales engineer by *Almco Division, Queen Stove Works,* in its Eastern branch.

Crown Chemical Opens San Francisco Branch

J. R. Pattenger

In order to better serve its many customers in the bay area, *Crown Chemical and Engineering Co.* opened a branch office and warehouse in San Francisco at 1 Dorman St. on June 1st. Company headquarters and main plants are at Los Angeles. Complete stocks are maintained at the San Francisco facility, including the products of *R. O. Hull & Co., Crown Rheostat,* and *The Chemical Corp.,* as well as other equipment and chemicals for the metal processing industry.

The new office and warehouse is under the management of *J. R. Pattenger.* Well known in the chemical and metal finishing industries throughout the bay area, Mr. Pattenger brings to his new association a wealth of experience in the chemical and metal finishing field. His formal training in the technical field was obtained at Midwest Kansas University.

Prior to joining the company he was with *A. J. Lynch & Co.* fourteen years where he established the metal

finishing department in San Francisco and was manager of same. Prior to this, he represented *Charles F. L'Hommedieu & Sons Co.* for four years, and was connected with the *Wyandotte Chemicals Corp.* for six years, in the San Francisco area.

Mr. Pattenger has been a member of the *American Electroplaters Society*, San Francisco Branch, for many years and has filled all of the offices, two-time president and currently is chairman of the board of managers.

Jan (Skip) Beery has been appointed sales engineer. Mr. Beery received his B.S. in Chemistry from the University of Southern California in 1947 and was formerly employed by North American Aviation, Inc. for six years

Jan (Skip) Berry

as a chemical research engineer in the production development laboratory. In this capacity, he worked on both experimental and development phases of electroforming, electroplating, and finishes on production aircraft, as well as process control engineer for plating and processing aircraft parts in the job shops in and around the Los Angeles area. During World War II, he served with the 1st Marine Division for three years.

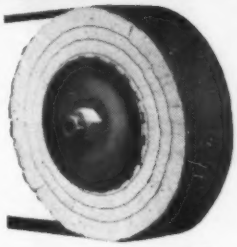
Mr. Beery spent the month of September in the plant of *R. O. Hull & Co.* in Cleveland for intensive training on Hull products.

Joseph Lupo Joins Lupoline

Joseph Lupo has joined the *Lupoline Automatic Polishing Equipment Corp.* as president. He will head the production and have full charge of the laboratory and research work.

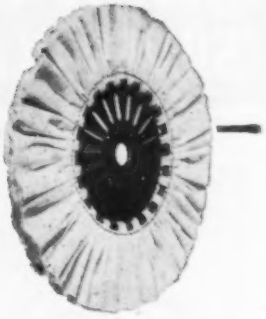
Mr. Lupo, who developed most of the precision tumbling processes and modern types of tumbling machines in use today, was formerly president and general manager of *Lupomatic Tumbling Machine Co.* for nearly 30 years. His creative ability, knowledge and vast experience in the field will aid relations with the industries using tumbling equipment and compounds.

A FEW OF THE MANY
FORMAX
PRODUCTS



STYLE C-20
CONTACT WHEELS
and F-26 Belt Lubricant

A C-20 flexible Contact Wheel will form itself to the shape of the work and permit the abrasive felt to polish contoured surfaces and F-26 Abrasive Belt Lubricant will increase belt life by preventing loading and glazing. Produces finer, smoother and brighter surfaces through lubrication.



ZIPPO BUFFS

These famous long-wearing buffs run cool under all buffing conditions. Constructed of high count bias-cut cloth or sisal mounted on safe steel centers. Available in a wide range of densities and center diameters.

A complete line of buffing compounds in bar form as well as in liquid form for brush or spray application. Also Flex-A-Glu polishing wheel cements.

Our Laboratory and Sales Engineering staff would welcome the opportunity to be of help in solving your finishing problems.

Send for descriptive literature

FORMAX MFG. CORP.
DETROIT 7, MICHIGAN
"THE FOUR McALEERS"

MANUFACTURED IN CANADA BY JOHN GALLOWAY LTD., KITCHENER, ONT.

Franklin Institute Honors Dr. Blum

An Elliott Cresson Medal, awarded by *The Franklin Institute* of the State of Pennsylvania for distinguished contributions in the realm of physical sciences, was presented to *Dr. William Blum*, former Chief of the Electrodeposition Section of the *National Bureau of Standards*, "In recognition of his long continued and unusually mer-

Dr. William Blum

How to cut your SILVER PLATING costs

Use the silver anodes that bear this stamp

It's the stamp you find only on Handy & Harman 999 "Plus" Fine Silver Anodes . . . the stamp that guarantees . . . (1) highest possible standards in fineness . . . (2) best physical properties for plating . . . (3) complete freedom from impurities that can cause plating trouble . . . the reasons why you are sure of trouble-free, low-cost, profitable plating when you use Handy & Harman 999 "Plus" Fine Silver Anodes. Try them and see.

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HANDY & HARMAN FOUNDED 1867 QUALITY · SERVICE

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Bridgeport, Conn. · Chicago, Ill. · Los Angeles, Cal.
Providence, R.I. · Toronto, Can.

itorious work in creating a modern scientific basis for the electrodeposition of metals, and for his development of useful processes in that field," according to the citation accompanying the award.

The Franklin Institute formally presented the medal at its annual Medal Day ceremonies, Wednesday evening, October 21.

Guthrie Appointed by 3M

Donald R. Guthrie has been named assistant general manufacturing manager of the coated abrasives and related products division of *Minnesota Mining & Manufacturing Co.*

Guthrie formerly was executive engineer in charge of engineering research. After joining 3M as a research chemist in 1939, he spent 5 years with the chemical and color laboratory.

He joined the engineering department in 1944 and has since served as division engineer for the chemical and color division, central research department, new products division, the products fabrication laboratory and the central manufacturing division. He also served as head of the chemical engineering department.

Wyandotte Chemicals Adds to Boston and Cleveland Staffs

Robert J. Racine, manager, industrial sales, announces the addition of *Edward H. Rollfs* to the Boston and *Samuel M. Peek* and *Paul G. Lackney* to the Cleveland sales and service staffs of *Wyandotte Chemicals Corp.*

Edward H. Rollfs

Rollfs graduated from Virginia Polytechnic Institute as a ceramic engineer. He completed a training program with Florence Stove and became a test research engineer for the U.S.A.A.F., assigned by Wright Field. Following this, he joined the Chrysler Corporation as a project engineer. He has recently been a sales engineer covering New England and Eastern states. He is a member of the *American Chemical* and *American Electroplaters' Societies,* and will cover the Boston area.

Peek has sixteen years' experience selling or directing sales to industrial organizations. He has developed new industrial applications in two of his former connections. Well known in the Cleveland area, Mr. Peek has worked for Johns-Manville and Owens-Corning. He is a member of the *Electro-*

Samuel M. Peek

Paul G. Lackney

chemical Society, the *National Association of Corrosion Engineers* and the *American Electroplaters' Society*. He will center his activities in the Akron, Canton, Mansfield and western Cleveland territories.

Lackney has had many years of sales and merchandising experience and is well known to users of industrial cleaning materials in the Cleveland area. He is a member of the Foreman's Club of Greater Cleveland and the *American Electroplaters' Society*. He will cover the Columbus, Marion and Toledo sections of Ohio.

Messrs. Rollis, Peek and Lackney recently augmented their knowledge of metal cleaning and processing operations with an intensive training course at the newly-occupied Wyandotte Chemicals Industrial Research Labs.

Michigan Chrome Appoints Dr. R. M. Lacy

Michigan Chrome and Chemical Co., Detroit, Mich., announces the appointment of *Dr. R. M. Lacy* as technical director. Dr. Lacy is a graduate of the University of Oklahoma, where he earned his PhD in Chemistry and Physics.

Dr. R. M. Lacy

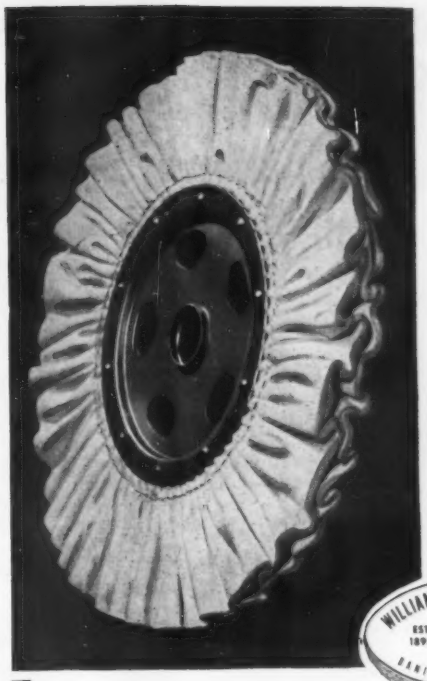
For the past ten years he has been with the General Electric Co., Bridgeport, Conn., as laboratory manager, Major Appliance Division. Dr. Lacy will be in charge of research and development work on vinyl plastisols and other synthetic coatings for the electroplating, wire goods, textile, automotive, and electrical equipment industries.

3M Expanding "Honite" Distributor Organization

Expansion of the distributor organization for "Honite" barrel finishing abrasive chips, compounds and equipment has been announced by *Minnesota Mining and Mfg. Co.*, 900 Fauquier St., St. Paul, Minn.

To date twelve distributors have been appointed in major industrial centers, the nucleous of a distributor organization designed to eventually make company sales and service available in every important metal finishing center in the country. It was stressed that distributor's shops are available for barrel finishing job work at any time, and that the distributors are backed by 3M's sales engineers, skill and know-how.

Present distributors are: *Micro Deburring Co.*, 5827 West Lake St., Chicago 44, Ill.; *Mechanical Finishing Co.*, 7032 Vine St., Cincinnati, Ohio; *Metals Finishing Corp.*, 836 East 10



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Look at
Williamsville's
New
CUTMASTER
for Automatic Buffing!

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WILLIAMSVILLE BUFF DIVISION EST 1893 A1 ® DANIELSON CONNECTICUT

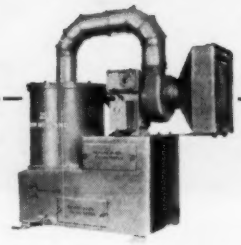
Cut on the bias for long, rugged service
Steel center is perforated for cool running
Engineered throughout for perfect balance

Let me rush you full details of how the new CUTMASTER can cut your automatic buffing cost now—write, wire or phone!

WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company
DANIELSON, CONNECTICUT

Why it pays to SPIN-DRY plated work— small lacquered parts

Choose from 3 carefully engineered models . . .



1. **Standard Model.** Takes nearly every type of part. Built for long, trouble-free service.

Saves time . . . With the New Holland Kreider Dryer operating at 625 r.p.m. on only ¾ h.p. you can *spin-dry* a basket of parts (1140 cu. ins.) in as little as 35 seconds—no more than 2 minutes.

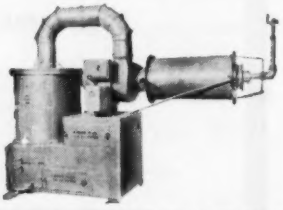
Improves quality . . . With a New Holland Kreider Dryer, high speed centrifugal spin-drying eliminates scarring and marring, assures smooth evenly dried surfaces, with longer lasting luster . . . fewer "rejects."

Cuts costs . . . What's more, though a New Holland Kreider Dryer occupies less than 6 sq. ft. of floor space, it's a big money saver. Power costs are low, production high—with little or no maintenance over years. And one man can operate it, easily, efficiently.

See for yourself. Write Department MF-11 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

2. **With Auxiliary Steam Heating Unit.** Used for small parts that hold moisture—lacquered parts—or where cold water rinse is used.



3. **With Auxiliary Gas Heating Unit.** Used for small parts. Caution: Do not use with inflammable materials.

NEW HOLLAND *KREIDER* DRYER

Mile Road, Hazel Park, Mich.; *Metal Parts Processing Co.*, 74 Chapel St., Newark, N. J.; *Metal Finish, Inc.*, 410 Frelinghuysen Ave., Newark 5, N. J.; *M. E. Baker Co.*, 25 Wheeler St., Cambridge, Mass.; *Deburreo, Inc.*, 2212 N. 27th St., Philadelphia 32, Pa.; *Gerell Mfg. Co.*, 3521 King Ave., Cleveland 14, Ohio; *Mosher Co.*, 15 Exchange St., Chicopee, Mass.; *Precision Tumbling & Supplies Co.*, 149 Ravencrest Drive, Stratford, Conn.; *Sundmark Supply Co.*, 1700 East Gage Ave., Los Angeles, Cal.; and *Tumbling Products, Inc.*, Indianapolis, Ind.

Handy & Harman Honors Howard W. Boynton

Handy & Harman, refiners and fabricators of precious metals, paid high tribute to their vice-president and treasurer, *Howard W. Boynton*, October 19, on the occasion of his 50th anniversary with the company.

At a company dinner at the Waldorf-Astoria Hotel, attended by 110 of his associates, *J. C. Travis*, president of the company, presented Mr. Boynton with a 14 karat gold tray inscribed with appropriate sentiments for his long service.

When Mr. Boynton joined the company in 1903 he was a 13-year-old office boy. Before he was 30, he was appointed assistant manager of the New York plant. He then rose to credit manager, secretary-treasurer, and in 1950 he was elected vice-president. He is also a member of the

Howard W. Boynton

company's board of directors and executive committee.

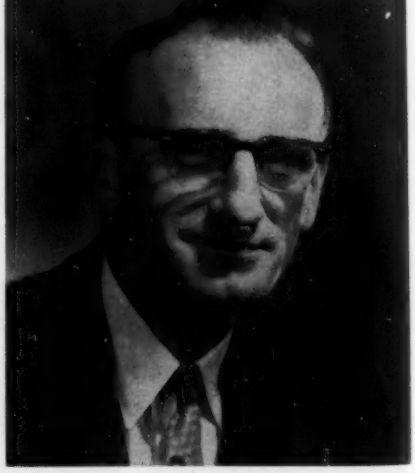
Mr. Boynton is a member of the silver committee of the Commodity Exchange and a director of the 24 karat Club of New York.

Toastmaster at the dinner was *G. H. Niemeyer*, director and chairman of the executive committee. Principal speakers were *Cortlandt W. Handy*, chairman of the board, and *Robert H. Leach*, director.

Electro-Glo Appoints Dostale

John Jumer, president of *Electro-Glo Co.*, Chicago electropolishing chemical manufacturer, has announced the appointment of *Carl T. Dostale* as plant superintendent.

Dostale has been associated with the metal finishing industry for 17 years, during which time he has held supervisory positions with the Aluminum Company of America, Dover Industries, Hub Plating Works, Electro-



Carl T. Dostale

Coatings, Inc., and Chromium Corp. of America. He is a member of the *American Electroplaters' Society*, and has contributed to several publications in the metal finishing field.

H-VW-M Appointments

Dr. Otto Kardos

Dr. Otto Kardos has been appointed to the post of chief research electrochemist by *Hanson-Van Winkle-Munning Co.*, manufacturers of electroplating equipment and supplies.

He has been associated with the H.-V.W.-M. organization for nine years. After receiving his Ph.D. from the University of Vienna, he worked as an electrochemist in Austria, and was later an electroplating consultant in France for four years.

The company also announces the appointment of *Walter R. Lockwood* as district manager of the Indiana-Kentucky and Tennessee territory. Assisting him will be *Richard Marshall*, who has been newly appointed to cover Kentucky and Tennessee, along with a part of southern Indiana.

Walter R. Lockwood

Lockwood, whose headquarters will remain in Anderson, Ind., will continue his direct sales responsibilities in the rest of Indiana. With the company for 20 years, he has worked in this territory for the past 13 years. Prior to that, he did electrochemical field service work for the company along the Atlantic seaboard. He attended Rutgers University, and is a member of the *American Electroplaters' Society*, Indianapolis Branch.

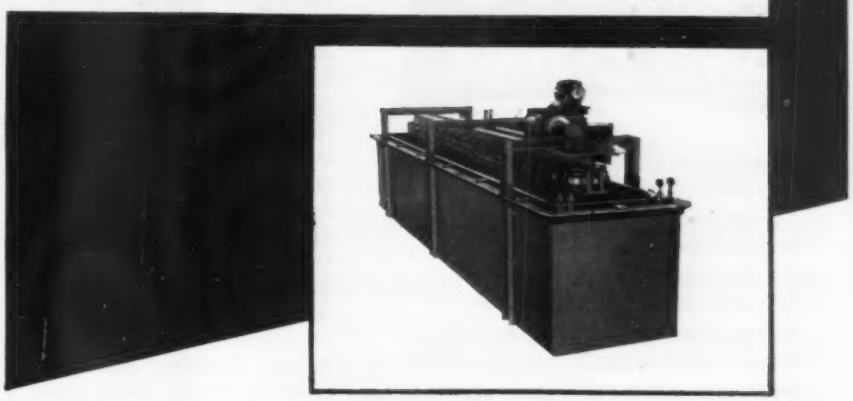
Marshall, whose headquarters will be in Louisville, has just completed a two-year training program at the company's main office and laboratory. A member of A.E.S., he came to H.-V.W.-M. from the plating laboratory at National Cash Register Co., Dayton, Ohio. He is a graduate of Michigan State College, B.S. in Chemistry, 1948.

John S. Hart has been appointed field electrochemist. Working out of the Detroit office, he will trouble-shoot and service customer plating installations in Michigan and Ohio.

Hart, who has worked in the finishing and plating field for the past 14 years, leaves Oakman Plating Co., Detroit, where he was general manager. He formerly worked for National Plated Products as works manager, and Chrysler Corp., Engineering Division, as a plating engineer.

Author of two articles on silver plat-

MANHATTAN RUBBER LININGS



. . . For Better Protection

Plating and pickling equipment manufacturers specify Manhattan Rubber Linings where ordinary applications do not afford adequate tank and solution protection against contamination and corrosion. Proof of the dependability and long life of Manhattan Rubber Linings is their record of giving continual, uninterrupted service for as long as 25 years or more.

Made from calendered sheets in required thickness of natural or synthetic rubber, Manhattan Linings eliminate plating "risks" . . . give longer life and more protection . . . eliminate stray currents. Every lined tank is tested to 15,000 volts to detect imperfections.

As a result of over half a century of experience in meeting the needs of equipment manufacturers, Manhattan has developed the most dependable and economical rubber linings with an exclusive rubber-to-metal bond that is inseparable.

For linings which meet your most exact requirements of economy and dependability, specify "Manhattan Rubber Linings."

RUBBER LINING PLANTS AT PASSAIC, N. J. AND NORTH CHARLESTON, S. C.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

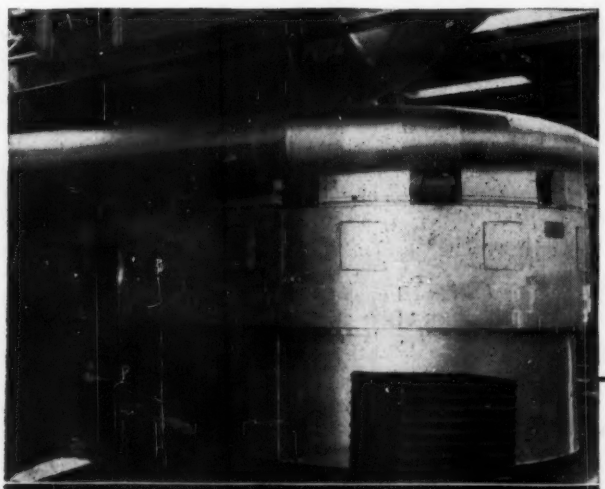
RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles • Teflon
Products • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

KIRK AND BLUM
FUME CONTROL SYSTEM
Saves 5 Ways..

1. REDUCES AIR VOLUME
2. LOWERS MAINTENANCE COSTS
3. CUTS REPLACEMENT COSTS
4. IMPROVES WORKING CONDITIONS
5. ELIMINATES DAMAGE TO OTHER EQUIPMENT

In large and small plants, Fume Control Systems engineered, fabricated and installed by KIRK & BLUM show substantial savings by increasing the life of costly plating equipment.
Here, a hood—with convenient access openings encircles the tanks — preventing cross currents and reducing air volume requirements.
Fumes are picked up at the outside of the tank, clean air is drawn over the machine's mechanism in the center, thereby keeping damaging corrosive fumes away from costly moving or mechanical parts.



KIRK & BLUM Fume Control on an Automatic Plating Machine in a noted auto ignition parts plant. Note hinged anode access and inspection doors just above tank top.

Write for Booklet F, showing typical installations.
The Kirk & Blum Mfg. Co.,
3159 Forrer Street,
Cincinnati 9, Ohio

Richard Marshall

John S. Hart

ing aircraft bearings, he is a graduate of Michigan State College, B.S., 1939, and Chrysler Institute of Engineering, M.A., 1941. He is a member of the *Electrochemical Society* and the *American Electroplaters' Society*.

News from California

By Fred A. Herr

Carroll McLaren has sold the Santa Ana Plating Works which he has operated in Santa Ana, Calif., for the past half dozen years. The new owner is *R. C. Berry* who, since 1946, has served in the finishing department of Kwikset Lock Co., Anaheim, Cal. Berry has been active in the finishing industry for 17 years. He started in Charles Williams' California Plating Co. plant in Los Angeles in 1937. Berry plans to expand the Santa Ana shop from the strictly job work (chromium, nickel, copper, brass and cadmium) handled by McLaren to production work. McLaren's future plans have not been announced. Immediately after closing the sale, he and Mrs. Mac left for a fishing trip to Colorado

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G. F. "Lefty" See, formerly with Surface Alloys, Inc., Los Angeles, in September moved to the Industrial Heat Treating Co. as superintendent of the firm's newly installed plating division. This is one of the few heat treating companies in the Los Angeles area which operates its own plating department. Initial equipment consists of copper solution facilities used for stop-off work, carburizing and nitriding. Chromium equipment will probably be installed by the first of the year, See reported.

A polishing, plating and lacquering division of 8,000 sq. ft. has been included in the plans for a new 50,000 sq. ft., $160,000 factory to be erected by the F. E. Olds & Sons Co. of Los Angeles at Fullerton, Cal., for the manufacture of band instruments.

Chromium and nickel facilities will be installed for use in plating trombone slides and pistons on valve instruments. *F. A. Reynolds*, general manager, reported that the finishing

division will include a completely integrated department for polishing and lacquering a natural brass finish on musical instruments so that none of the work will have to be done outside the new plant. Facilities for silver plating horns will also be installed. The finishing department will employ 35 men, with *Jack Cordova* as plating foreman.

Crown Chemical & Engineering Co. has moved from 5649 Alhambra Ave., Los Angeles, to 4722 Worth St., same city, where larger quarters in the form of a 10,000 sq. ft. building, with rail spur facilities, are available. The new setup also provides space for the manufacture of Lusteron for the *Chemical Corp.* of Springfield, Mass., for which Crown Chemical serves as western distributor, and the distribution of a general line of plating shop equipment and chemicals. Associated in the operation of the firm are *Jack Beale, Tom Turner* and *Hal Wells*. A San Francisco Branch was recently opened at No. 1 Dorman St.

James White, formerly foreman of the Machlett Laboratories, Springdale, Conn., moved his family to Southern California recently and is now employed in the shop of Santa Monica Plating Co., Santa Monica, Cal. He plans to transfer his A.E.S., membership from Bridgeport to Los Angeles Branch.

P. N. Burkard, manager of industrial, aircraft and railroad sales for *Wyandotte Chemicals Corp.*, recently announced the completion of a special aircraft industry service team. This "team", which headquarters on the Pacific Coast, is composed of:

James Y. Brame, Jr., who will specialize in servicing air frame manufacturers. He holds an advanced degree in chemistry from the University of Alabama, and has done considerable work in this subject at universities in New York and Los Angeles. He has served the U. S. Army for seven years and was discharged a Lt. Colonel. Mr. Brame has wide acquaintance in the aircraft and supporting industries and will headquarter at the company's Pacific Coast plant in Los Angeles.

Kenneth W. Clayton, who will specialize in servicing metal finishers. He studied chemical engineering at the University of California and Okla-

COMING EVENTS OF THE A.E.S.

PHILADELPHIA BRANCH

EDUCATIONAL SESSION AND BANQUET

NOVEMBER 21, 1953

BROADWOOD HOTEL — PHILADELPHIA, PA.

DETROIT BRANCH

EDUCATIONAL SESSION

DECEMBER 4th, P.M.

BANQUET AND DANCE

DECEMBER 5th, P.M.

HOTEL STATLER — DETROIT, MICH.

NEWARK BRANCH

ANNUAL EDUCATIONAL SESSION

DECEMBER 18, P.M.

ANNUAL CHRISTMAS PARTY

DECEMBER 19, P.M.

HOTEL ROBERT TREAT — NEWARK, N. J.

NEW YORK BRANCH

Sponsoring

41ST ANNUAL A. E. S. CONVENTION

JULY 12-15, 1954

HOTEL STATLER — NEW YORK CITY

Left to Right: James Y. Brame Jr., Kenneth W. Clayton, Lloyd F. Coates, Robert C. Gertson, Richard C. Booth.

homa A.&M. College. Mr. Clayton has operated his own industrial cleaning and painting business, and has supervised metal processing and painting lines for well known California firms. He will also headquarter in Los Angeles.

Lloyd F. Coates, who has recently joined the Aircraft Department of the company, headquartering at the San Francisco office. Mr. Coates studied engineering at the University of Washington and has many years of experience servicing cleaning operations for Pacific Coast chemical manufacturers. He was recently associated with a chemical supply division of Transocean Air Lines.

Robert C. Gertson, who will specialize in aircraft overhaul and maintenance. He is a graduate of the University of Southern California and has studied chemical engineering at the University of Pittsburgh. Mr. Gertson served five years in the U. S. Army Chemical Corps. During his years with Wyandotte Chemicals, Mr. Gertson has had broad and varied technical experience with the aircraft and supporting industries. He recently attended a refresher course at the company's research laboratories at Wyandotte, Mich. He will headquarter in Los Angeles.

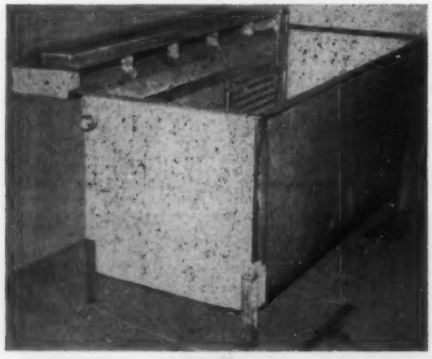
Richard C. Booth who has joined the company's technical service group, specializing in aircraft problems, and will headquarter in the laboratories at the Los Angeles plant. He served three years with the U. S. Air Force, attended two Air Force training schools in addition to advanced university training in chemical engineering, and supervised maintenance and repair of aircraft both as a civilian and as an officer. Mr. Booth has in recent years been Supervisor of the Chemical Section of the Materials and Process Division at the U. S. Naval Air Station, San Diego, and also spent two years working on confidential chemical projects at the U. S. Naval Ordnance Test Station, Pasadena.

John S. Hunter, Pacific Coast representative for the *F. L. and J. C. Codman Co.*, buff and polishing wheel manufacturers, was reported in mid-October to be getting along well following a stroke which he suffered in September. He was confined for several weeks to his home at 1800 Bradburn Road, Altadena, Cal.

Amercoat Corporation, manufacturers of protective coatings and corrosion-resistant industrial sheet lining materials, has plans underway for erection of a new research laboratory and enlarged office facilities adjacent to its main manufacturing plant at 4809 Firestone Blvd., South Gate, Cal.

The department of engineering, University of California, in collaboration with the western region division of the *National Association of Corrosion Engineers*, will present a short course in Cathodic Protection at 813 South Hill St., Los Angeles, November 16, 17 and 18.

Purpose of the course is to summarize current information and techniques employed in the control of corrosion through cathodic protection. The six-hour daily sessions are to include basic electrochemical principles, corrosion circuit theory, corrosion engineering, instruments and measuring techniques, design and application of cathodic protection, and economics of cathodic protection.



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FILTER 50-1500 GAL/HR ANY ELECTROPLATING SOLUTION

NO ROUGH DEPOSITS
NO PITTING

SETHCO FILTER PUMP ASI-600

Service: Filters practically any acid or alkaline solution from pH 0 to pH 14; removes particles down to one micron in size. Strainer stops metallic objects.

Design: Filter Assembly fabricated of stainless steel 316, high temperature lucite, rubber-lined, Haveg, or Sethrin* resin. Filter Tubes of cotton, dynel, porous stone, or porous carbon. Pumps fabricated of Hastelloy, stainless 316, or plastic; centrifugal or self-priming. Motors drip-proof, totally enclosed or explosion-proof, 110 or 220 volt, single or three-phase, 50 or 60 cycle, sleeve or ball bearing. Hose — 12 ft. inlet and 12 ft. outlet acid and alkaline resistant. Base — phenolic base on rubber tire ball bearing casters.

*Reg. App. For

Distributors in Principal Cities

Model	Rated Capacity	Overall Size	Weight
LSI-5	50 gal/hr	11" x 14" x 12"	30 lb.
LSI-10	100 "	12" x 16" x 16"	40 "
ASI-300	300 "	2' x 2' x 2'	125 "
ASI-400	400 "	2' x 2' x 2'	135 "
ASI-600	600 "	2' x 2' x 2'	150 "

Sethco

Write for Literature
74 Willoughby Street
Brooklyn 1, New York

The 3-day instruction course precedes the opening of the Western Region Division Conference of the A.E.S.E. to be held at the Los Angeles Biltmore Hotel, November 19-20.

The Los Angeles sales office of *Powers Regulator Co.* of Skokie, Ill., has been moved to a new headquarters at 320 West Temple St., Los Angeles. The western manager is *David Ladd*.

Injury to six persons and damage of $200,000 to facilities occurred as the result of a butane explosion in a truck which was unloading at the Moberg Laboratories, Los Angeles, on September 17. The laboratory building was virtually destroyed.

Three days later, the Los Angeles Plant of the Pacific Bronze Co. suffered damage to the extent of $100,000 from a fire which was touched off by a motor spark in a paint spraying booth, engulfing the one-story building. The factory was reported a total loss. The firm made and finished bronze baby shoes, bookends and similar bronze items.

Manufacturers' Literature

Polishing & Buffing Equipment

Schaffner Mfg. Co., Inc., Dept. MF, Schaffner Center, Emsworth, Pittsburgh 2, Pa.

The above firm has issued catalog No. 54, which gives details on their polishing and buffing compounds, buffs, anodes and hooks, cement and hand cleaner. A convenient order blank is enclosed.

For further information regarding any of their products, or a copy of the booklet, address requests to the above address.

Industrial Water Softener Brochure

Illinois Water Treatment Co., Dept. MF, 840 Cedar St., Rockford, Ill.

A new and remarkably different ion Xchange Industrial Water Softener Brochure has recently been published by the above company, containing all necessary information for the accurate specification of water softener equipment for any type of manufacturing or processing plant where hardness-free water is required or desired.

Attractively printed in two colors, the booklet contains complete data on valves, as well as detailed chart-type specifications on the many sizes of Illco-Way softener units, showing individual model numbers, exchange capacities, flow rates, size of units and meters, volume of mineral, amount of salt and shipping weight. There basic types of exchange materials are thoroughly described.

One of the outstanding highlights of the new brochure is a cut-away drawing of a typical unit. This drawing shows the inner workings of the softener, water and brine distribution mechanism, exchange material depth, etc. Supplementary sketches show the direction of water and brine flow during service, brine-rinse and regeneration cycles.

Precision Barrel Finishing

Lord Chemical Corp., Dept. MF, 2068 S. Queen St., York 9, Pa.

The above company, a leading manufacturer of chemical compounds

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- NICKEL SULFATE
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- CADMIUM
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- NICKEL CARBONATE
- ZINC CYANIDE
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IS YOUR PROBLEM
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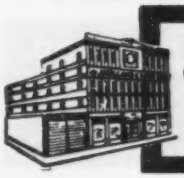
HOLLAND SUGGESTS:

Holland Periodic Reverse Current Unit; adapted for use with separately excited electroplating generators. Gives smoother and faster electrodeposits with finer grain and less porosity.

Write for new Holland Equipment Catalog . . . complete with illustrated data and valuable information for the metal finishing field.



J. HOLLAND & SONS, INC.
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for precision barrel finishing, has issued a 32-page handbook and catalog on "Lorco" compounds for descaling, deburring, abrasive cut-down, non-abrasive cut-down, finishing, coloring, burnishing, metal cleaning and rust inhibiting.

Twenty standard compounds, and three special purpose compounds, are described in detail: industrial purposes, characteristics, uses, special advantages, and field data. A "rapid application index" serves to give the reader a quick reference to the particular standard and special purpose compounds recommended for various applications. A series of 24 unretouched "before and after" photographs show the results accomplished by the compounds in cutting down, coloring, burnishing, descaling, and finishing typical machine and equipment parts.

Testing Instruments

General Electric Co., Dept. MF, Schenectady 5, N. Y.

A buyer's guide on electric testing instruments has been announced as available.

The new 16-page bulletin, designated GEA-5469B, provides data on such instruments as hook-on volt-ammeters, hook-on wattmeters, hook-on power-factor meters, portable recorders, voltmeters and ammeters, phase-sequence indicators, hand pyrometers, surface roughneses scales, insulation-resistance meters, and others.

Application data, features of each instrument, and prices are included.

Barrel Finishing

Almco Division, Queens Stove Works, Inc., Dept. MF, 505 Front St., Albert Lea, Minn.

The Almco "Supersheen Process" is detailed in newest publication, "Advanced Speed Finishing." Much of the information contained in this booklet represents years of research and development and has heretofore remained unpublished and somewhat "under cover."

The booklet has been published primarily to introduce the trades to the newest, most economical way to handsomely improve the finishes of their products and solve their finishing problems.

Sheet Finishing Equipment

The Murray-Way Corp., Dept. MF, P. O. Box 180, Birmingham 1, Mich.

This informative, 10-page brochure gives a complete description of micro-polish units for polishing coils, blanks, and sheets of steel, brass, aluminum, rubber etc.

"How to Run a Production Test of Metal Abrasives"

Harrison Abrasive Division, Metals Disintegrating Co., Inc., Dept. MF, Elizabeth B, N. J.

This is the subject of the new, five-page Technical Bulletin No. 6 now being distributed without cost.

With the full realization that, in the past few years, many different types of metal abrasives have been placed on the market with the request that prospective users try them — that these prospects are hesitant to upset their production by running such tests, the bulletin simplifies the procedure of the production tests. Findings will determine the abrasive that will yield the desired results at the least overall cost.

Step-by-step test procedure is clearly

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Nickel Sulfate, Chloride, Carbonate & Formate

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The Triangle Bias Buff is a sewed cloth buff of unique design constructed to cut on the bias. It will replace conventional loose and sewed buffs on most operations at a considerable saving in original cost.

The construction method which permits cutting on the bias is new in a buff of this type. In most cases this feature affords a noticeable increase in production, less buff wear, and less operator fatigue.

Among other advantages —

- ▲ Triangle Bias Buffs cost less.
- ▲ Are constructed to cut on the bias.
- ▲ Last longer; increase production; and run cooler than ordinary loose & sewed buffs.
- ▲ Hold compound better; are non-ridging, and cross-cutting in action.
- ▲ Plus many other cost cutting and better production features.

Write today for complete information. Include diameter, arbor hole size, and type buff you now use and let us show you how to cut buff costs.

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and simply stated in detail. In addition there are pictorial examples of a data sheet. The company also offers to send a set of forms including data sheets, plotting sheets and evaluation sheet to use in running the tests.

Combination Phosphate and Organic Finish

Specialty Coatings, Inc., Dept. MF, Oakmont, Pa.

An actual sample of Vinsynite, a metal pretreatment used in metal finishing and maintenance, is included in a new set of literature. The set comprises three pieces, one containing an actual specimen of the product applied to a panel of mild steel. Sections of this panel show graphically how the process combines pretreatment with the deposition of a thin organic film, thus providing both excellent adhesion and resistance to corrosion. The other pieces illustrate it in use on a wide variety of products and outline the simplified, low-cost application methods by ordinary brush, spray, dip, flow or roller. Also included are test data showing how the finish stands up under salt spray and distortion tests. The complete set will be forwarded free upon request.

Peroxygens for Metal Finishing

Buffalo Electro-Chemical Co., Inc., Dept. MF, Station B, Buffalo 7, N. Y.

New and improved methods of treating metal surfaces with peroxygen compounds are described in Bulletin No. 51 published by the above company. The new publication is based on additional research and development that has occurred since Becco's Bulletin No. 39 on the same subject appeared last year.

The types of surface treatments discussed include bright dips, cleaning solutions, passivation and inhibitors. Metals involved in the tests and investigations reported are: steel, aluminum, brass, silver and stainless steel.

The peroxygen compounds used in these new developments in metal surface treatment are hydrogen peroxide, compounds forming hydrogen peroxide in solution, persulfates and peracids. Details on their use, including numerous solution formulas, are given, and examples are cited.

Metal Washing Compound

Ipsen Industries, Inc., Dept. MF, 715 South Main St., Rockford, Ill.

A new, two-color catalog sheet describing metal washing compound 103 has been released. The fully illustrated sheet gives complete information on the new, non-corrosive, ferrous metal cleaning concentrate designed for quick removal of quenching oils after heat treating.

Special data explains the new principle under which compound 103 acts and tells of what materials the compound is produced. Attention is also given to a report of results which can be expected in effective removal of oil, grease, lubricants, soils, lapping and drawing compounds.

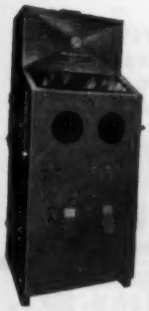
Steam Generators, Heat Recovery and Process Equipment

Union Iron Works, Dept. MF, Erie, Pa.

A new 20-page condensed catalog, now being circulated covers concisely a diversified line of steam generators and allied equipment.

Pressure Blast Application #192

Formerly, 6 minutes were spent buffing and polishing the "as cast" handle to the left in order to achieve the luster shown on the handle to the far right. A 20 second primary finish of the "as cast" handle by Pressure Blasting now reduces polishing by 50%.



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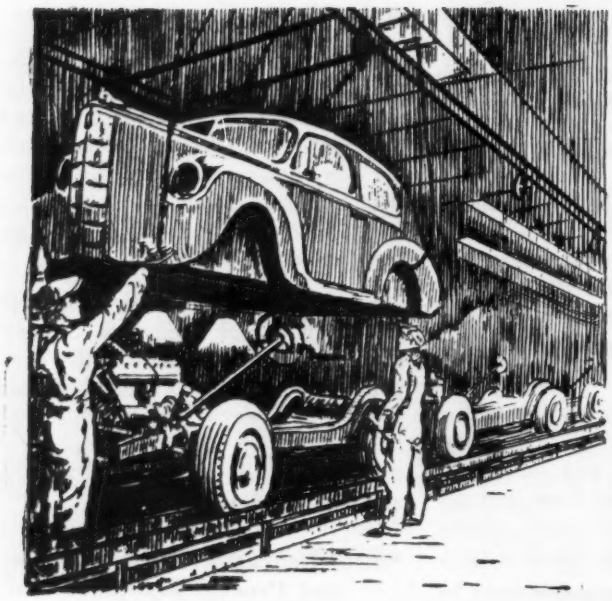

MOTOR CITY PLATING NEWS

Udylite Appoints Trees to New Executive Post

Robert C. Trees has been appointed to the newly created post of director of advertising, sales promotion and market research for the *Udylite Corporation*, it was announced by *Lawrence V. Nagle*, Udylite executive vice-president.

Trees was formerly advertising manager and chief estimator for the corporation. In this capacity he organized the estimating department of the Udylite Division. A graduate of Co-

Belke

Wire Basket with hinged handle. Also furnished with rigid handle.

Perforated Metal with rigid handle

Square Basket with rigid bar handle

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BELKE Dipping Baskets are made rugged and durable for plating service. In ordering specify inside dimensions, type, metal, etc., or write for bulletin.

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Wire or Perforated Metal—in steel, brass, aluminum, Monel, Nickel, Chrome.

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460A Grand Avenue, New Haven, Connecticut

Robert C. Trees

lumbia University, he held executive positions in varied manufacturing fields prior to joining Udylite in 1943.

Nagle, in making the announcement, said the corporation's growth during recent years and its expected continued expansion resulted in creation of the new position.

Detroit Branch

The technical session on the eve of the Detroit Branch A.E.S. annual Christmas party will be held in the Statler Hotel, December 4th at 8:00 P.M. This annual meeting educational session will be devoted to the A.E.S. research program.

The honorary chairman will be *Dr. William Blum*, National Bureau of Standards, who will give an illustrated talk on his Australian trip. Dr. Blum, world famous authority on electroplating, attended the First Australian Federal convention on electroplating. During his three months visit, he not only lectured to various A.E.S. branches, but also to chemical and metallurgical societies and university groups.

The speakers to be presented by Dr. Blum are as follows: *Dr. Earl J. Serfass*, Lehigh University, who will talk on "Recent Development in the A.E.S. Research Program"; *Walter L. Pinner*, Houdaille-Hershey Corp., will summarize "Progress in Development of a New Accelerated Corrosion Test" representing activity of A.E.S. Research Project No. 15; *Dr. A. E. R. Westman*, Ontario Research Foundation, will present "A Metallographic Study of Some Steels used for Nickel Plating," as developed in A.E.S. Research Project No. 14.

BETTER COMPOUNDS *mean* MORE PRODUCTION *and* INCREASED PROFITS

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Technique of Spray Painting

By ARTHUR L. PHILLIPS

Reprints of this article which appeared in the August issue of *Organic Finishing* are available, free of charge, by request on your Company Letterhead.

Send Requests To

METAL FINISHING

381 BROADWAY, WESTWOOD, N. J.

A very large turnout is expected for this meeting and all who attend are urged to come early for assurance of good seats.

J. C. Drinkwater
Publicity Chm.

Minutes of Meeting — Friday, September 11, 1953.

President *L. C. Borchert* called the first meeting of the 1953-54 season to order at 8:15 p.m. in the Michigan Room of the Hotel Statler, with approximately 150 members and guests present.

After the showing of a colored movie *Pheasants Galore*, an interesting view of ringnecked pheasant hunts in South Dakota, chairman *Fred Ohmsteadt* introduced *Dr. Henry Brown*, Research Director of the Udylite Corporation, the principal speaker.

The talk concerned a corrosion study of various thicknesses of combinations of copper, nickel, and chromium on different basis metals, as compared to salt spray, humidity, and outdoor exposure tests. In determining this, the evaluation of the connection of the respective roles of the inherent porosity of the coatings involved, and the electrochemically induced porosity of the coatings. Inherent porosity is the main factor in lack of protection for a given plate or combination of plates on a given basis metal in a given environment, and in which cases electrochemically induced porosity is the dominant factor.

Slides were shown which depicted conditions of exposure through mediums of salt spray, humidity and outdoor exposure tests. It was shown that the outdoor protection afforded by nickel increased geometrically as the thickness was increased with chromium over nickel. The pores in the chromium were apparently widened by the pressure of the corrosion products of the nickel underneath which in turn caused minute flaking away of the chromium at the side of the pore. Therefore, the corrosion pit widened a little faster than it penetrated downward. Consequently, thicker total deposits (up to .0015"-.0020") of copper, nickel, and chromium, as compared to thinner total deposits (.0010"), stand up to outdoor exposures much longer than might be suspected.

A question and answer period followed. The meeting was adjourned at 10:00 p.m.

Fellowship continued after the meeting with the serving of beer and pretzels.

John C. Drinkwater,
Publicity Chairman

Wagner Equipment Now in Production

The recently formed *Wagner Brothers Equipment Co.* has acquired a production plant where the firm's new fully automatic electroplating machine is in production, according to *John D. Tebben*, president.

First of the new machines has been delivered and is in operation and a backlog of orders assures the major part of the new plant will be on full-time for months to come, it was stated.

Another section of facilities is being tooled for the manufacture of semi-automatic platers, package unit platers, agitators, and anode containers, items to be marketed by *Wagner Brothers, Inc.*, warehouse suppliers. The company will soon offer a tank lining

KNAPP ANNOUNCES Three New h.m. Mills Developments

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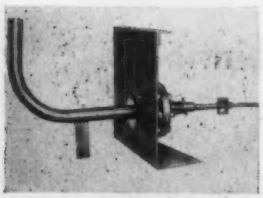

2. *FERROLUM GAS HEATER

Low fuel cost, simple to operate, direct fired. Efficient, compact, economical, simple to operate and install. Sturdy, excellent corrosion resistance.

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High efficiency, low steam pressure. Large heating surface — Economical and efficient.

*Ferrolum is bonded lead clad steel.

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NEW! RAMPE TWIN PRECISION BARREL FINISHER

"THE MOST MACHINE FOR THE LEAST MONEY"

This sturdily built Barrel Finisher will handle steel burnishing balls in both barrels — is amply powered by a ¾ H.P. 220 volt 3-phase motor for standard 10¾"x17" barrels or larger barrels, as desired.

WITH UNLINED BARRELS $535.00

Safety covers for barrels prevent pressure build-up. Starting button is water proof. Has ball bearing variable speed drive. 2 tote boxes are standard equipment, — also perforated covers far barrels. Lined barrels are coated with vinyl plastic.

WITH LINED BARRELS $615.00

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RAMPE MANUFACTURING CO.
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service featuring a new type of material.

Wagner Brothers Equipment Co. is a new firm organized by employees of Wagner Brothers, Inc. and will confine its activities to manufacturing. The new plant is located at 42056 Michigan Ave., Wayne, Mich.

Detrex Holds Conference

Michigan and Northern Indiana sales representatives of the *Industrial Equipment Division* of the *Detrex Corporation*, Detroit, major manufacturer of industrial metal-cleaning machinery and chemicals, have concluded a conference at the Hotel Fort Shelby on "creative selling."

The conference, described as a refresher course in the numerous applications for metal degreasing equipment, was presided over by *David E. Williard*, sales manager of the division.

A. O. Thalacker, Detrex president, addressed the group at luncheon and reported that the consumption of industrial cleaning solvents in the country this year represented a 20 per cent increase over 1952.

Use of ultrasonic waves to clean intricate metal parts, a development pioneered by Detrex, was demonstrated at the conference.

J. J. Siefen Co. Elects Officers

The *J. J. Siefen Co.* announces the election of *John F. Siefen* to the presidency of the company. Other officers are *I. E. Siefen*, vice-president and treasurer, and *John R. Siefen*, secretary.

Wyandotte Promotes Dr. Waldeck

Promotion of *Dr. William F. Waldeck* to director of research and development of *Wyandotte Chemicals Corp.* was announced recently by *Robert B. Semple*, president.

Dr. Waldeck succeeds *Dr. Thomas H. Vaughn*, who is leaving the company November 1 to become vice-president in charge of research and development of Colgate-Palmolive-Peet Co.

A native of New York City, and a chemical engineering graduate and recipient of a doctorate in chemistry from New York University, Dr. Waldeck, 43, came to the company in 1939 from the Columbia Chemical Division of Pittsburgh Plate Glass Co., where he was acting director of research.

He has served Wyandotte as assistant director of technical service, assistant director of research and director of chemical research. A member of the *American Institute of Chemical Engineeds* and the *American Chemical Society*, he is active in the professional organizations, and as a horticulturist is known for his skill in the growing of orchids.

Dr. Waldeck and his family live in Grosse Ile, Mich. His headquarters are in the newly completed Wyandotte Research Center.

Baughman Becomes ARco Department Head

Another well-known rubber technician has been added to the *Automotive Rubber Co.'s* Detroit organization. He is *Robert O. Baughman*, formerly of the Heaveatex Corp., latex compounders and brokers.

Baughman will be in charge of ARco's newly enlarged rubber product development department. In addition to his functions as the company's

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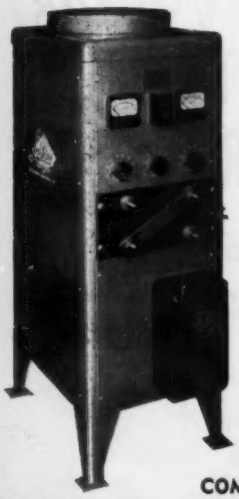
For the Finest in PLATING RECTIFIERS



A BETTER SOURCE OF DC POWER — MORE FOR YOUR MONEY

Now Lektron plating rectifiers are available in two types. (1) Lektron Selenium for cool zones, or (2) Lektron Magnesium-Copper Sulphide for the hot, dirty, tough jobs. Heavy duty transformers — husky fan motors — built to last. Built-in voltage regulation — meters — or remote control optional.

Units operate from minus 40° F. to 225° F. at 50 - 50,000 amperes DC. No failures in units working 4 years "round the clock." Investigate "LEKTRON" before you buy — get quality of product backed by a company of integrity at a "price you can afford."

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Illustrated — 750 amperes 2-16 volts to 1500 ampere 1 - 8 volt DC. Full wave type with builtin regulator. For use with 208, 220 or 440 volt 3 phase AC. 20" x 26" x 56½" steel cabinet in gray hammerloid. Weight 725 lbs.

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chemical laboratory head. Baughman will assume top responsibilities for latex product development and sales.

Beginning his chemical product development career with Goodyear in Akron, Baughman has pursued his work in industry to win recognition for a number of achievements. He is credited with the development of many compounds and procedures in the uses and handling of natural and synthetic latices.

Robert O. Baughman

J. C. Miller Appoints Slater

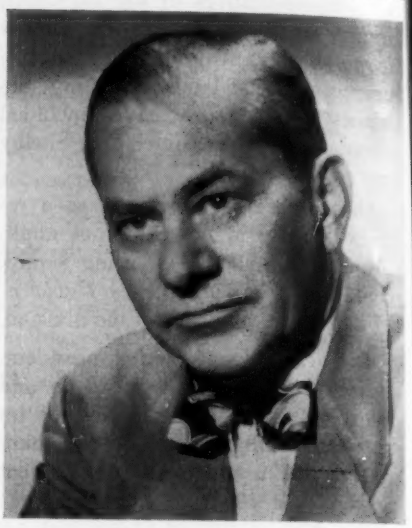
Roger I. Slater

The *J. C. Miller Co.* of Grand Rapids, Mich. announces the recent appointment of *Roger I. Slater* as sales representative in the Southern Ohio area. Mr. Slater, who has had wide experience in all phases of the finishing industry, has established his headquarters in Cincinnati, Ohio.

Sagendorf Appointed by Detrex

The *Detrex Corporation* of Detroit, major manufacturer of industrial metal-cleaning equipment and chemicals, has announced the appointment of *Rodney E Sagendorf* as administrative assistant to *W. F. Newbery*, director of sales.

For two years, Sagendorf has been



Rodney E. Sagendorf

YOU CAN SAVE MONEY WITH THE WALLACE

VAPOR DEGREASER

- √ Electric
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- √ Production Size
- √ Insulated
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Only $257.50!

For quick, inexpensive cleaning of oils, waxes, greases, etc. from metal stampings, die-castings, screw machine parts, the Wallace DG-1 Vapor Degreaser is unexcelled. No plumbing required for installation; easy plug-in operation makes it available to many departments in larger plants for "on-the-spot" cleaning.
Incorporates all the features, *plus*, at a fraction of the cost of large units. Low-priced within the budget of the smallest shop.
For free bulletins and prices, write today.

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BRIGHTER

Barrel Nickel Plating with TRUE BRITE NICKEL BRIGHTENER

Increase Production

easy to control . . . cuts down on trouble that entails costly delays.

Save time

can be operated at a higher speed.

Reduce Rejects

gives unbelievable uniformity of deposit in recesses . . . brighter, white color.

Write for **FREE** *bulletin revealing tricks on improving your nickel plating and cutting costs.*

TRUE BRITE CHEMICAL PRODUCTS CO.
P. O. Box 31, Oakville, Conn.

chief of the chlorinated solvents section, Chemical Division, of the National Production Authority in Washington, D. C. He was with the Packard Motor Car Company in New York from 1938 to 1942, when he joined Detrex as Manhattan representative. He was loaned to the government for four years during the war, attached to office of the Chief of Ordnance in Washington and Detroit. He returned to the company in 1945 to become expediter for the purchasing department, later was placed in charge of the general sales office, and then became the company's Ohio representative for two years before joining the NPA.

Born in Kingston, N. Y., he was raised in Weehawken Heights, N. J., and Portland, Me., and now resides at 1431 Seminole Ave., Detroit. He took courses in law, traffic and general business administration in New York City, and LaSalle Interstate Commerce & Railway Traffic, Chicago.

He is a member of the Chemical Bureau Alumni Association and the American Ordnance Association.

Palmer Shile Co. Expands Manufacturing Facilities

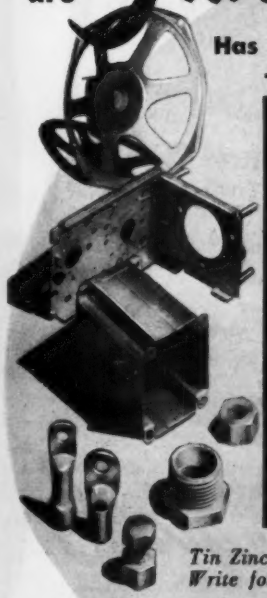
Palmer-Shile Co., 12651 Mansfield, Detroit 27, Mich., nationally known manufacturers of a wide line of materials handling equipment announce an additional 15,000 square feet of manufacturing capacity known as Plant No. 4. This is the third expansion in the last three years. The company began operations in 1917. The purchase of new equipment to handle the increase in production was also announced.

Associations and Societies

New York Branch

The forty-first annual convention of the *American Electroplaters' Society* will be held in New York City at the Statler Hotel, July 12-15, 1954. Since the New York Branch is the mother

TIN-ZINC plating results are 5 WAYS BETTER



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1 **COST-WISE** Uses 20% less tin than electrotinning, 60% less than hot dipping. Metal cost is about half that of Cadmium.

2 **PROTECTIVE-WISE** Gives unequalled corrosion resistance. Less porous than pure tin—outperforms zinc in salt spray tests.

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4 **SOLDERABILITY-WISE** Surpasses even pure tin in ability to retain good solderability during storage.

5 **PRODUCTION-WISE** Process is easily adaptable to most types of plating equipment. No special precautions needed in preparation of work.

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of the A.E.S., its having been organized in this city in 1909, we should like to give a brief history of the Society.

The idea of a platers' organization was conceived by *Charles H. Proctor*, who felt that in this way there would be a better understanding of the technical and chemical controls of plating solutions in order that platers might assist one another in solving the various problems which arise in plating rooms, which would in turn tend to improve the science of the electrodeposition and finishing of metals.

Letters were sent to platers discussing the idea, some got together, and on April 10, 1909 the *National Electro-Platers' Association* was under way, with forty charter members. Mr. Proctor was president, *Ben Gilchrist* secretary, *Nathan Emery* treasurer and *George B. Hogaboom* librarian.

Soon charters were granted to other cities, and as the Association grew a committee was appointed to try and form a Supreme Body to consist of representatives from all the branches. On February 13, 1913, the A.E.S. as we know it today was started, with the first convention being held that year. Afternoon sessions were inaugurated and the ladies were invited to attend the yearly banquets.

Those forty charter members have increased to the thousands, with branches in the United States, Canada, and Australia. We owe a vote of thanks to those early pioneers who did so much to make the Society the honored and respected group it is today.

Meeting of Sept. 26th

The meeting held September 26th, 1953 in the Hotel Statler, New York was called to order by *A. Amatore*, the president, and a roll of officers was called. *J. Sterling* was noted absent.

The following men were elected to membership and duly installed: *R. Morriss, J. Van Rohr, C. Martin, P. Caruta, C. Antmann, A. Galassi.*

The following transfers were read and accepted by this branch: *S. Rosenblatt* (Providence) and *W. Jeffries* (Chicago).

There being no other business old or new, the meeting was turned over to the librarian. *P. Viet.* No speaker having been slated for the evening, Mr. Viet outlined a few of the highlights of the coming educational meetings for 1953-54. There was a short period of questions and answers, followed by "Can You Top This," which was started by *D. Clarin.*

Philadelphia Branch

The following are the speakers and topics for the annual meeting of the Phila. Branch of the A.E.S., to be held on Saturday, November 21, 1953 at the Broadwood Hotel, Broad & Wood Sts., Philadelphia, Pa.:

E. G. Schroeder of Electric Products Co., Cleveland, Ohio. "Application, Use and Maintenance of Motor-Generator Sets & Rectifiers for the Electrolytic Processes."

Milton Nadel of Berkeley Industries, Jersey City, N. J. "Defects in Plating Solutions and Their Remedies."

R. A. Schaefer of Cleveland Graphite Bronze Co., Cleveland, Ohio. "Cathode Forms and Their Effect on Metal Distribution."

Jackson-Lansing Branch

The Jackson-Lansing Branch, A.E.S. held its first meeting of the year, September 12, 1953, in the form of a stag golf day at the Arbor Hills Country Club, Jackson, Mich. Arbor Hills is a pleasant and sporty 18-hole

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course but the day was ruined for the golfers by being cold, windy, and rainy. However, numerous card games and bull sessions took over. About one hundred and twenty-five members and friends of the branch remained to participate in a swell chicken dinner and the distribution of prizes. No complaints were received on details of day's activity.

Chicago Branch

All the big fish are caught! If anyone doesn't believe it, he should have been at Chicago Branch meeting on Friday evening, September 11. Some 100 A.E.S. members gathered to relate their summer vacation experiences and begin a new season of A.E.S. activity.

After cocktails and dinner, the group assembled in the auditorium to hear *H. A. Gilbertson* read a paper on "The History of Plating." Mr. Gilbertson, past national president, honorary life member and "The Order of the Pot" recounted many interesting and amusing experiences acquired during a life-time of activity in the electroplating industry.

The art of plating is at least 3,000 years old. Mr. Gilbertson told about the discovery of a cosmetic container in an Egyptian excavation which was made of silver with a 9 kt. gold plate. Historians estimated this article had been in use approximately 1,000 years before the birth of Christ. Let's have nomore comments about electroplating, the infant industry.

Paul Glab is busy with plans for a revised Chicago Branch member's directory. Members will shortly receive an inquiry card requesting information on company association, residence and position which should be filled out carefully and returned promptly. The value of a membership directory cannot be overestimated.

October's meeting brought *Dr. Gregoire Gutzeit* of General American Transportaition Corp., to the speaker's roster. He addressed the society on chemical plating. Dr. Gutzeit has been instrumental in the development of electroless nickel plating. His presentation explaining this unique process should prove of great interest to the membership. *Russ Harr* is to be complimented on an educational "first."

The new season started on a high note with the admission to membership of *Bert Allen* of McGean Chemical Co. and *Edward Proskocil* of Koley Plating Co. of Omaha, Neb.

President *Joe Andrus* appointed *Ed Stanek* of Belke Mfg. Co. as chairman of the banquet committee for the annual Chicago Branch educational session to be held in January, 1954, which has been *Rudy Hazucha's* project for so many years.

Beginning with the next release, publicity chores for Chicago Branch will be handled by *Jerry Kuderna* of Scientific Control Laboratories. Jerry brings the youthful slant to this picture and his ideas promise readable articles loaded with interest for all A.E.S. members.

"They Were There" Department

H. A. Gilbertson brought his own cheering section — *Lester Dunbar, E.*

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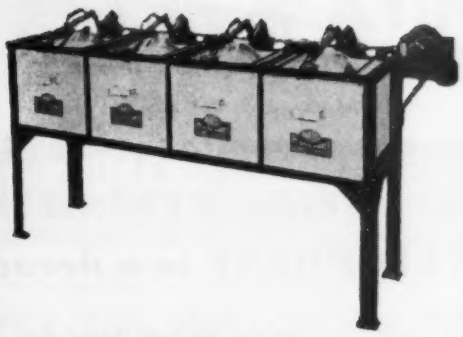

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Jacobson, *Mildred Davidson* and *Esther King* — heard that *Doc Monaweck* has developed a British accent — result of his honeymoon trip to England and Europe — and speaking of travelers, saw *Frank Lavitas* with *Marty Westergaard* — *J. M. Bondreau* now associated with Lake Shore Electrotype — *Art Krause*, formerly with A. O. Smith now working for Riverdale Metal Finishes — *John Cottone* and *Henry Huinzinga* looking tanned and refreshed — *Al Brumm* of Kuehne Mfg. with *Fred Bryan* now with Wagner Brothers — *Bill Barron* of Lyons Band Instrument and *W. H. Murphy* of Diversey Corp. — *Mal Focht* and *Carl Lodico* of Heatbath Corp. — *R. L. Brown* visiting for Solventol Chemical — and *Ed Demlow* of Anchor Coupling — *Lou Lanz* looking in the pink — *Fred Hubrich* of Bell & Howell and *Ed Wild* of R. O. Hull — good to see *Sy Gary* again — all in all, a distinguished gathering to start Chicago Branch on a new season of service to the electroplating industry.

Edward Stanek
2nd Vice-President

Indianapolis Branch

The Columbus members of the Indianapolis Branch were hosts for the October 7th, 1953 meeting. Ninety-four members and guests enjoyed a steak dinner and program at the Arvin Industries Cafeteria.

At the business meeting the secretary's report was read and accepted. *Herb Kennedy* reported on the regional meeting which will be either April 3rd or 10th, 1954 in Cincinnati. The first committee meeting with all branches represented will be on October 8th. The Indianapolis Branch will continue to have its annual dinner dance in the Spring.

One new member was voted into the society in a motion by Herb Kennedy and seconded by *Ed Bruck*. He is *Kenneth H. Bennett* of Udylite Corp., 1827 MacArthur Lane, Indianapolis. There was one member transferred to our branch from the Chicago Branch. He is *Everett H. Babcock*, 4046 Adams Court North, Indianapolis.

The program was a group of musicians from Camp Atterbury under the direction of Lieut. Benson. The master of ceremonies was Ralph Rose of Los Angeles. Included were the "Five Kings" who sang; Stan Silvers harmonica; George Rogers, soloist; Paul Gaylord, soloist; and Maloom Sherwood, piano. The variety of the program pleased everyone.

Edna Roherbaugh
Secretary

Cincinnati Branch

The meeting opened with 40 members and guests present. President *Truman* introduced and welcomed the visitors.

A discussion was held concerning the election of a new treasurer to replace *Mr. Nuzum* who has left our area to accept employment in Bradford, Pa.

R. D. Miller suggested a committee be appointed to nominate a candidate for treasurer. It was voted to nominate and elect a treasurer at this meeting. The president called for nominations and *Richard K. Evans* and *Gordon T. Speers* were nominated. The first ballot resulted in a tie. Mr. Speers was elected on the second ballot.

Ezra Blount reported on the result of his visit to the Indianapolis Branch to discuss a regional meeting. He reported that Indianapolis would con-

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tinue their annual dinners but were in favor of a regional meeting and that they had appointed *Herb Kennedy* as their representative to meet with any committees for the regional meeting.

Mr. Gordon reported that Louisville was favorable but was worried about financing such a venture They asked for time to consider the matter of a regional meeting.

Mr. Miller reported that Columbus was favorable but did not have enough members present to make any decisions. Mr. Blount reported that Dayton appointed *Elmer Rehme* to represent their branch in the matter of a regional meeting. He read a letter from *John K. Eastman*, secretary of the Dayton Branch, stating the stand of their executive board. The motion was made, seconded and carried that the Cincinnati Branch have an annual dinner dance and educational session.

The application of *John R. Holaday* for membership was read and favorably acted on. It was voted to have the treasury books audited and *Charles Wise* and *Stewart Chipman* were appointed to audit the books. It was voted to pay the Engineering Society the additional forty cents per member necessary to defray the expenses of operating the society building for meeting purposes, the forty cents to be paid out of the treasury.

D. S. Roland of Sarco Co., Inc. gave a very interesting and informative talk on "Temperature Control in the Plating Industry."

The social hour was sponsored by the Harshaw Chemical Co.

William Young
Secretary, Cincinnati Branch

Los Angeles Branch

An open forum discussion on the prospects of greater nickel distribution following the decontrol of that metal on November 1 brought out some valuable, but not too optimistic, information at the October 14 meeting of Los Angeles Branch of the *American Electroplaters' Society*.

Harold Kroesche of the *Harshaw Chemical Company's* Los Angeles organization served as discussion leader. The picture he painted on the possibilities of the plating industry being allocated greater amounts of nickel was not too encouraging. Mr. Kroesche declared that while he looks for an equitable distribution of nickel following decontrol, any platers who expect to be supplied in car load lots are apt to be disappointed.

In Mr. Kroesche's opinion, the nickel situation should show some improvement following decontrol; there may be an increase generally and the small consumer will undoubtedly come in for his share. But the Harshaw representative expressed doubt that the suppliers will receive larger stocks after decontrol. He declared that, if 50 per cent of nickel supplies are left over for general industrial purposes after military needs have been taken care of, that would be a generous estimate at this time. How much of the general supply will go to the plating industry, nobody knows at this time, acording to Mr. Kroesche.

The programmed speaker at the educational session was *R. C. Scott*, chief electrical engineer, *Udylite Corporation*. He presented a prepared paper on "The Application of Dry Disc Rectifiers to Plating."

The business and technical sessions attracted an attendance of 110, with

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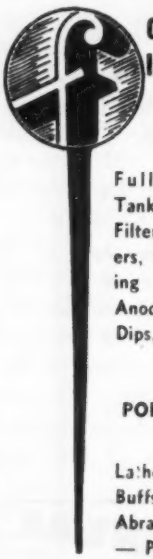

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the overflow standing along the walls. President *John Millhorn* presided over the initiation of six new members. These were: *Charles W. Crowl*, Electro-Weld Co., Azusa, Cal.; *Jerry Nahring*, Adams-Rite Co., Glendale; *Don Baudreau*, Eldred Laboratories, Los Angeles; and *C. E. Askew*, *K. E. McBride*, and *Harry Smith*, all of Quality Hard Chrome Plating Co., Los Angeles.

Guests introduced by sergeant-at-arms *Alex Heller* included *Miss Mary Fuller*, Kwikset Lock Co.. Anaheim; *Victor Trodone*, North American Aviation; *Henry Kono*, Allied Products, Inc.; *James Wolf*, Virtue Bros.; *Marion Sutton*, Harshaw Chemical Co.; *Norman Painter*, Hall-Mark Co.; *Al Price*, California Technical Industries; *Jack Abramson*, Atlas Plating Co.; and *James White*, Santa Monica Plating Co., a member of Bridgeport, Conn., Branch.

Past-presidents *Roy Lostutter*, *Earl Coffin*, *Don Bedwell* and *D. N. Eldred* were introduced by the chair. The mystery of a long-missing folding cabinet in which identification buttons of members are displayed before meetings was solved when *Larry O'Neil* of the L'Hommedieu & Sons Co., former sergeant-at-arms, disclosed that he had just recently discovered the cabinet cozily resting on a shelf in his garage.

San Francisco Branch

At its last meeting held in the El Curtole Restaurant, Oakland, Cal., San Francisco Branch of the *American Electroplaters' Society* approved the recommendation of a special committee that files of the A.E.S. reports, proceedings, magazines and general information be provided for access to the public in the San Francisco and Oakland main public libraries.

Secretary *Horace J. Smith* was instructed to circularize the membership, and also to include in meeting notices for the next several months, requests for back copies of *Plating* and the annual proceedings of the society for presentation to the libraries. A recommendation that the committee investigate the advisability of establishing similar A.E.S. information depots at the University of California in Berkeley, and Stanford University in Palo Alto., was approved.

Twin City Branch

The Twin City Branch of the *American Electroplaters' Society* met on Monday, October 5, 1953 at 7:00 P.M. in the Lodge Room of the Covered Wagon in Minneapolis with 32 persons present.

Following dinner, branch president *Paul Hesse* of General Mills, Inc., introduced the three new members: *Walt W. Edwards*, *Richard Carlstrom* both of W. D. Forbes Co. and *Myron I. Doebler* of Superior Plating & Rust proofing Co. The new members were welcomed into the branch by all present.

Following the short business meeting president Hesse turned the meeting over to *Robert Teply* of Northwest Airlines, Inc., who introduced the speaker for the October meeting, namely *Walter Pocock* of the Allied Research Products, Inc., Baltimore, Md., who spoke on chromate finishes for magnesium and aluminum. Mr. Pocock's talk was very interesting inasmuch as it brought out the types of reactions which take place between the base metal or deposited coating and the various chromate conversion coatings and the results which would be expected thereof. Following the completion of his talk, Mr. Pocock was presented with a small gift on behalf of the Twin City Branch.

The meeting adjourned at 9:30 P.M.

Robert L. Buckley
Secretary-Treasurer

Louisville Branch

The regular monthly meeting of the Louisville Branch, American Electroplaters' Society was held September 17, 1953 at Korfhages Restaurant, 1482 Preston St., with a dinner served at 6:30 P.M. President *P. H. Pate* opened the business and open meeting at 8:00 P.M. with 28 members and guests present.

Due to the fact that a large program was scheduled for the night's meeting, president Pate decided to dispense with the formalities of the regular meeting and called upon *Stanley J. Beyer*, as chairman of the open meeting. Stanley, after a brief talk, introduced *I. A. Lee*, of the Rectifier Department, General Electric Co., Lynn River Works, Lynn, Mass., as the speaker of the evening. Mr. Lee spoke on the subject of rectifiers including the advantages of rectifiers over generators. Considerable discus-

sion followed and Mr. Lee was given a rising vote of thanks for a very interesting talk.

Bill Young, secretary of the Cincinnati Branch A.E.S., was called upon to give the Louisville Branch members a talk on the proposed regional meetings to be held in conjunction with the Cincinnati, Dayton, Columbus, Indianapolis, and Louisville Branches as participants. Mr. Young stated that he would like to get the thinking and opinion of these branches to see what can really be accomplished to further such a plan. After some discussion President Pate stated that we would try to have an answer at our next meeting October 15, 1953. We thanked Mr. Young for his nice talk.

Raymond M. Schock, executive secretary of the National Association of Metal Finishers, Inc., was then called upon and gave us some very interesting news defined as "News Behind the News." It was a very interesting talk to the plating industry and we were very happy to have Mr. Schock talk to us.

Due to the late hour the branch decided to dispense with the showing of the movie.

The following were appointed to the standing committees:

Membership Committee: *John Scholl*, chairman, and *Ray McDaniels*.

Sick Committee: *Wm. W. Francis*, chairman, and *Kenneth Reifsteck*.

Publicity Committee: *J. C. Sterling*, chairman, and *Albert Seidle*.

Educational Committee: *Stanley J. Beyer*, chairman, and *Ray Shallcross*.

The meeting adjourned at 10:30 P.M.

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC.

Elections announced at annual meeting of the Association, October 27, 1953.

Officers 1 year each (all officers re-elected for a second term).

President: *Foster Dee Snell*, pres., Foster D. Snell, Inc., New York City.

Vice-Pres.: *Abraham Taub*, cons. chem., Coll. of Pharmacy, New York City.

Secretary: *Thomas P. Kearney*, dir., Industrial Testing Labs., New York City.

Treasurer: *Percy E. Landolt*, Landolt & Whitney, New York City.

OBITUARY

DR. COLIN G. FINK

Dr. Colin G. Fink, professor emeritus of chemical engineering at Columbia University and former head of its electrochemistry division died in Red Bank, N. J., on September 16th. He was 71 years old at the time of his death.

One of the world's leading chemists, Dr. Fink was best known in the field of metal finishing for his development of chromium plating as a commercial process and for a method of coating steel with aluminum. To the general public, however, he was famous for his development of an electrochemical process to restore old bronze which enabled the Metropolitan Museum of Art to restore priceless Egyptian antiques in bronze.

He was born in Hoboken, N. J. and educated in New York schools. He attended Columbia University and also studied at the University of Leipzig. From Germany Dr. Fink returned to this country to become a research worker for General Electric Co. at Schenectady and was invited to teach at Columbia in 1921. He was a Fellow of the American Association for the Advancement of Science, former president of the American Chemical Society and a member of the National Research Council and American Institute of Mining and Metallurgical Engineers. Dr. Fink was a winner of the Acheson medal of The Electrochemical Society and the Perkin Medal of the Society of Chemical Industry. He

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NEW BOOK

Finishing Handbook and Directory

Published by Sawell Publications Ltd., 4 Ludgate Circus, London, E. C. 4, England. 1953. 512 pages. Price 21s.-0d.

The 1953 edition of this handbook-directory has been rearranged and enlarged to include the most up-to-date information available, especially on the subject of organic finishing. Although the directory lists about 3,000 brand names and 600 sources of supply, this section would not be of much interest to the American reader. However, new and revised sections on vacuum deposition, vitreous enamel, marking and transfer processes, which are generally unavailable in most other handbooks, would alone make this book a worthwhile investment. Of course, it contains the usual sections on plating and other methods of metal finishing, which the plant man will have occasion to refer to regularly. Because of the wealth of information incorporated in this edition, it has been necessary to use smaller type to avoid a cumbersome volume.

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